AUGUST 2001
ISSUE #489
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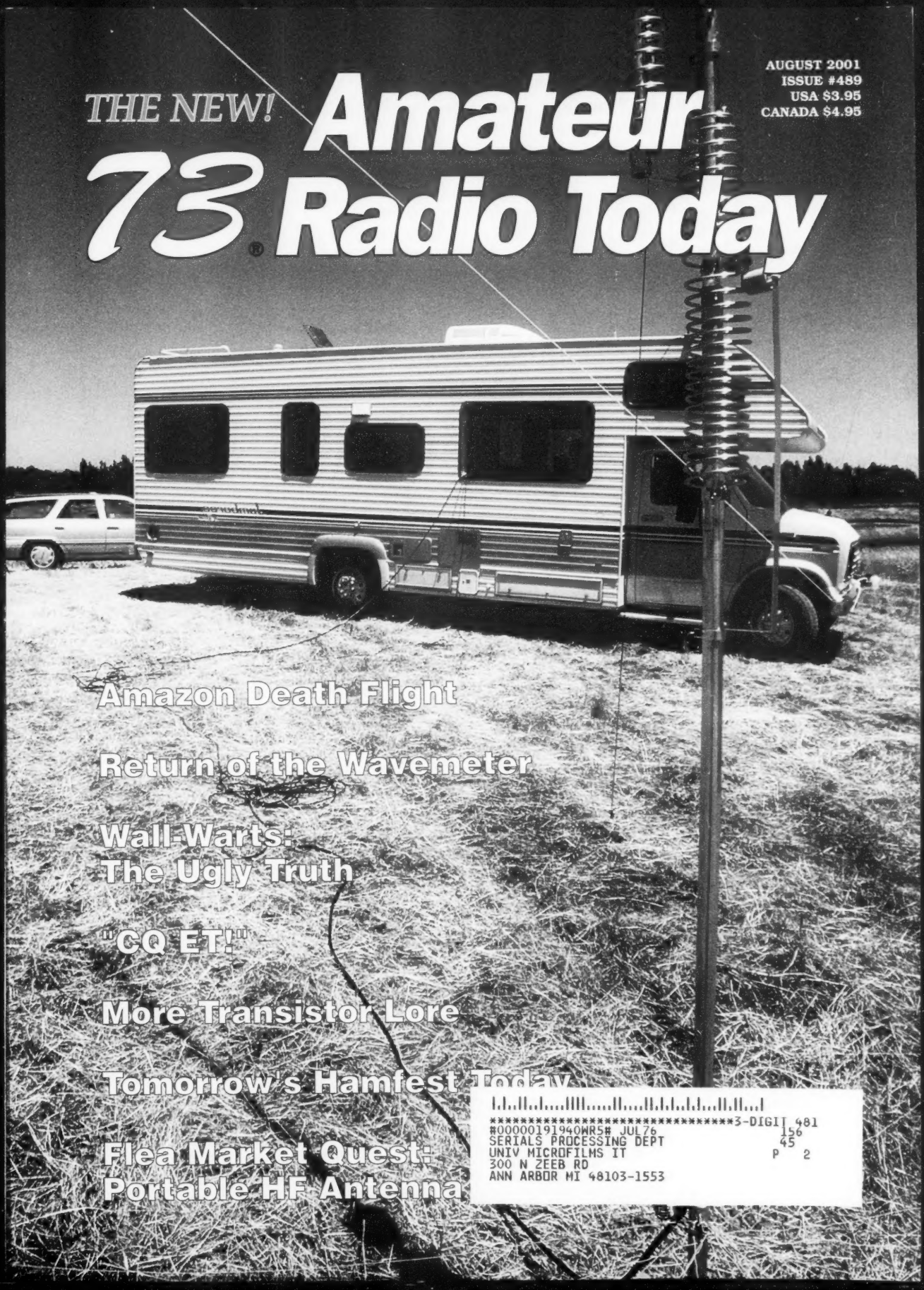
THE NEW!

73 Amateur Radio Today®



Amazon Death Flight

Return of the Wavemeter

Wall Warts: The Ugly Truth

"CQ ET!"

More Transistor Lore

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Flea Market Quest: Portable HF Antenna

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El Supremo & Founder
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Associate Publisher
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Executive Editor
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Larry Antonuk WB9RRT

Contributing Culprits
Mike Bryce WB8VGE
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Joe Moell KØOV
Steve Nowak KE8YN/0
Dr. Rick Olsen N6NR

Advertising Sales
Evelyn Garrison WS7A
21704 S.E. 35th St.
Issaquah WA 98029
425-557-9611
Fax: 425-557-9612

Circulation
Frances Hyvarinen

Data Entry & Other Stuff
Norman Marion

Business Office
Editorial - Advertising - Circulation
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AUGUST 2001
ISSUE #489

THE NEW!
73 Amateur Radio Today

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Cover

Tired of hot days and cold nights in tents, in 1999 the New Helvitia (CA) ARC, WR6WR, rented this RV for some Field Day fun in Wilton CA. We are happy to send $100 to Rick McCusker KF6O of Sacramento for forwarding this cover shot. Any other takers?

QRX . . .

FCC to FCC: Restructure Thyself!

The FCC has asked for public input on ways to reorganize the agency. According to a report in *Broadcasting and Cable*, the action comes as the agency prepares to better respond to the consolidation of telecommunications services offered to all Americans.

Under the anticipated change, the FCC's industry-specific bureaus such as Mass Media, Wireless, and Common Carrier are expected to be realigned. This, along functional responsibilities such as licensing, enforcement, and consumer affairs.

The project is being led by FCC Special Counsel Mary Beth Richards, who expects to unveil a reform

Continued on page 6

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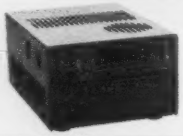

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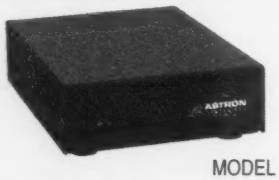

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SS-18	15	18	1⅝ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅛	4.2
SS-30	25	30	3¼ x 7 x 9⅛	5.0

MODEL SS-25M

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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SS-30M*	25	30	3¼ x 7 x 9⅛	5.0

MODEL SRM-30

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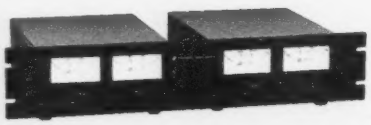
SRM-30	25	30	3½ x 19 x 9⅛	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅛	6.5
SRM-30M	25	30	3½ x 19 x 9⅛	7.0



MODEL SRM-30M-2

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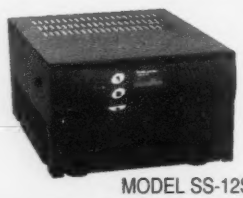
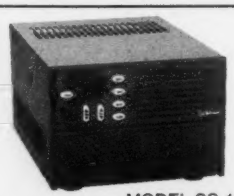
MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30-2	25	30	3½ x 19 x 9⅛	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅛	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅛	11.0



MODEL SS-12SM/GTX



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SS-18GX
SS-12EFJ
SS-18EFJ
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SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
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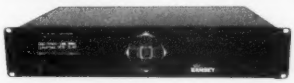

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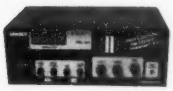

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- Built in mixer – 2 line inputs and one microphone input!
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FM100	**Super-Pro FM Stereo Radio Station Kit**	**$249.95**
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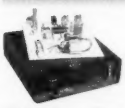

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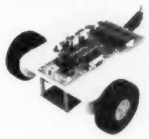

RK3000

This advanced kit is an 8 x 8" differentially steered base that is excellent for carpet or tiled floor experimentation. It uses the Next Step microcontroller, a BASIC Stamp 2 controller that can use the BS2 or BS2-E (sold separately). A host PC is required to download programs to the robot. This complete kit includes the Rover, programming cable, IR proximity detector, bumper switch kit, and line follower kit.

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Hobbyists and educators have embraced the Basic Stamp family of microcontrollers thanks to their power, ease of programming and simple interface. Ramsey now offers popular BS boards, kits, and trainers. If you've been wanting to learn microcontrollers, or build them into a project, now's the time!

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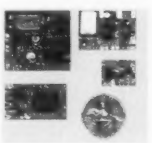

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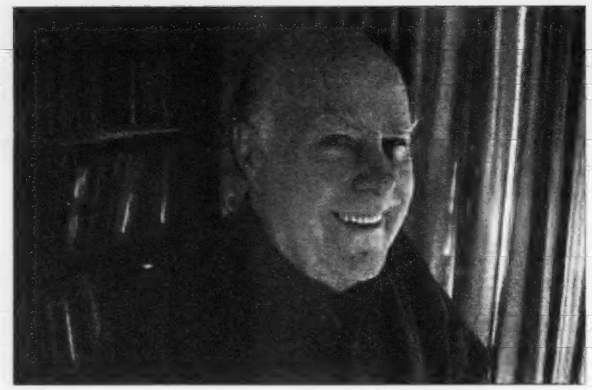

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Never Say Die

In 1831 he failed in business — bankruptcy. In 1832 he ran for the legislature and was defeated. In 1835 his fiancée died. In 1836 he had a nervous breakdown. In 1843 he ran for the US Congress and was defeated. In 1846 he was defeated again. In 1848 he was defeated in his third try for Congress. In 1855 he ran for the Senate and was defeated. In 1856 he ran for Vice President and lost. In 1858 he ran for the Senate again, and lost. In 1860 he was elected president.

Abraham Lincoln.

Yep, Another Conspiracy!

Old-timers, which, alas, most of us hams are these days, remember well President Roosevelt's Day of Infamy broadcast, which plunged America into the second world war. There were rumors at the time that Roosevelt had known that the Japanese were about to attack, but withheld this information from his commanders at Pearl Harbor. These rumors were so patently absurd, that they were ridiculed as crazy.

Now comes the exposé by Robert Stinnett in his $16 book, *Day of Deceit — The Truth About FDR and Pearl Harbor.* It's an incredibly detailed exposé of how Roosevelt forced the Japanese into the war, and the cover-up that followed. Roosevelt was warned by the Navy code breakers, as well as through diplomatic channels, that the Japanese had an aircraft carrier attack force heading for Pearl Harbor — and he intentionally kept this information from his Army and Navy commanders.

Now, why on earth would FDR do something so terrible? It doesn't seem to make sense.

Well, FDR had two major problems. The first was the war in Europe, which was going very badly. The Germans had conquered the continent and were getting ready to move on to Britain — and had a good chance of succeeding. But, the American public was vigorously opposed to getting into the war. They remembered the slaughter of millions of soldiers twenty years earlier during WWI. Eighty-eight percent of the public was opposed. Roosevelt knew that with all of Europe under Hitler's control, the next move would obviously have to be to America — so he had to come up with some way to change American opinions. He sure came up with a doozy.

The book goes into great detail, backed up with 116 pages of references, on how his eight-point plan to force Japan to attack us was orchestrated, and how he intentionally put incompetent officers in charge at Pearl Harbor, and then withheld the reports of the Japanese carrier movements from them. He helped see to it that the battleships were in Pearl, but not our aircraft carriers. He felt that battleships were obsolete and worth sacrificing. And so were the lives of our soldiers and sailors, if it would galvanize the American public.

The book contains virtually no speculation. Stinnett spent years forcing the Navy to produce the papers that had been hidden away, marked Top Secret. The National Security Agency (NSA) is still protecting over a hundred thousand pages of relevant documents under the cloak of their being national defense secrets. What a crock!

Our code breakers had broken every Japanese code, so Roosevelt knew exactly what they were doing. The Japanese fleet sent to attack Pearl Harbor was followed every day by our Navy listening stations at Dutch Harbor, Alaska; Samoa; Hawaii; and Corregidor with their direction-finding equipment. FDR knew where they were, and even who their commanders were. He also knew their plan of attack.

The plan sure worked. The day after the attack, the American public had no further reservations about going to war. Congress declared war on Japan on December 8th, and three days later on Germany and Italy.

I said there were two reasons for FDR wanting us in the war. By 1941 America was still suffering from the great depression of the '30s. FDR needed a jolt to get the economy going again. The war effort did that, in spades.

Even though we knew that Japan was gearing up to take over most of Asia — they called it the Greater East Asia Prosperity Sphere — FDR intervened with American authorities to allow them to buy millions of barrels of oil and tons of scrap iron, right up until hostilities started.

We kind of joked at the time that the Japanese had bought the scrap from our tearing down the 2nd, 3rd, 4th, and 6th Avenue Elevateds in New York City, and then were shooting it back at us.

The Pearl Harbor attack came off just as Roosevelt had planned. It got rid of a bunch of the no-longer-needed battleships and totally squelched the isolationists.

Oh, there were rumors at the time, but a panel asked to look into the rumors whitewashed everything, and all of the damning intelligence reports were either destroyed or put into vaults marked Top Secret — where they've remained until Stinnett managed to force them to be revealed.

The Space Station

Didja miss the PBS program on the space station? They tackled the obvious question anyone would ask right up front: What are the potential benefits of the space station to the American people to justify the billions of tax money being spent? Their answer was that, well, maybe it would help scientists discover a cure for cancer, AIDS, or osteoporosis. I'm not exaggerating — that was the explanation! There was no elaboration of why working in zero gravity with very limited lab resources and equipment would speed up this "vital" research.

Nor even a hint that one of the last things in the world the medical and pharmaceutical

Continued on page 7

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Mfg. suggested list price $529.95

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500 Channels • 10 banks • CTCSS/DCS • S Meter

Size: 7⅝" Wide x 6¹⁵⁄₁₆" Deep x 2¹³⁄₁₆" High

Frequency Coverage: 25.0000-512.0000 MHz., 806.000-823.9875MHz., 849.0125-868.9875 MHz., 894.0125-1300.000 MHz.

The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk certain systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display & backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette ligher cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for $29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com.

Bearcat® 895XLT Trunk Tracker

Mfg. suggested list price $499.95

Less -$320 Instant Rebate / Special $179.95

300 Channels • 10 banks • Built-in CTCSS • S Meter

Size: 10¹⁄₂" Wide x 7¹⁄₂" Deep x 3³⁄₈" High

Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box $14.95; MB001 Mobile mounting bracket $14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

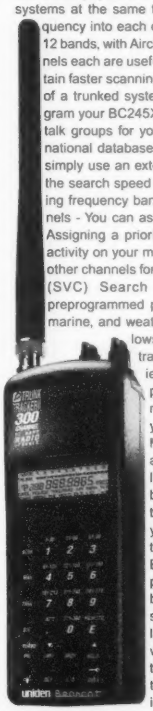
Bearcat® 245XLT Trunk Tracker II

Mfg. suggested list price $429.95/**CEI price $189.95**

300 Channels • 10 banks • Trunk Scan and Scan Lists
Trunk Lockout • Trunk Delay • Cloning Capability
10 Priority Channels • Programmed Service Search
Size: 2¹⁄₂" Wide x 1³⁄₄" Deep x 6" High

Frequency Coverage:
29.000-54,000 MHz., 108-174 MHz., 406-512 MHz., 806-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

Our Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes 12 bands, with Aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. Smart Scanner - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. Turbo Search - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. 10 Priority Channels - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. Preprogrammed Service (SVC) Search - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - An LCD light remains on for 15 seconds when the back light key is pressed. Autolight - Automatically turns the backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at www.usascan.com for quick delivery.



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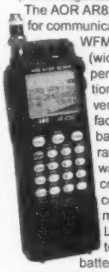

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configuarable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: CT8200 CTCSS squelch & search decoder $89.95; EM8200 External 4,000 channel backup memory, 160 search banks. $69.95; RU8200 about 20 seconds chip based recording and playback $69.95; TE8200 256 step tone eliminator $59.95. In addition, two leads are available for use with the option socket. CC8200 PC control lead with CD Rom programming software $109.95; CR8200 tape recording lead $59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigar lead, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty. Enter your order now at http://www.usascan.com.

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QRX . . .

continued from page 1

plan later this year. No specific due date for comments was posted by the FCC, but officials say they will be collected over the next several weeks. (Broadcasting & Cable)

Thanks to Broadcasting and Cable, *via* Newsline, *Bill Pasternak WA6ITF, editor.*

What to Do If You Lose Your Purse or Wallet

We've all heard horror stories about fraud that's committed using your name, address, SSN, credit, etc. Unfortunately I (author of this piece) have firsthand knowledge, because my wallet was stolen last month, and within a week the thieve(s) ordered an expensive monthly cell phone package, applied for a VISA credit card, had a credit line approved to buy a Gateway computer, received a PIN number from DMV to change my driving record information on-line, and more. But here's some critical information to limit the damage in case this happens to you or someone you know.

As everyone always advises, cancel your credit cards immediately, but the key is having the toll-free numbers and your card numbers handy so you know who to call. Keep those where you can find them easily (having to hunt for them is additional stress you WON'T need at that point!).

On a personal note, I remember losing an MC, and until I got the toll-free number from information, etc., I was a wreck. File a police report immediately in the jurisdiction where it was stolen — this proves to credit providers you were diligent, and is a first step toward an investigation (if there ever is one).

But here's what is perhaps most important (I never, ever, thought to do this): Call the three national credit-reporting organizations immediately, to place a fraud alert on your name and SSN. I had never heard of doing that until advised by a bank that called to tell me an application for credit was made over the Internet in my name. The alert means any company that checks your credit knows your information was stolen and that they have to contact you by phone to authorize new credit. By the time I was advised to do this — almost two weeks after the theft — all the damage had been done. (There are records of all the credit checks initiated by the thieves' purchases, none of which I knew about before placing the alert.) Since then, no additional damage has been done, and the thieves threw my wallet away this weekend (someone turned it in). It seems to have stopped them in their tracks.

The credit-reporting organization numbers are: Equifax, 1-800 525-6285; Experian (formerly TRW), 1-800-311-4769; and Trans-Union, 1-800-680-7289. The Social Security Administration also has a fraud line at 1-800-269-0271.

From the Internet.

The Bird

The other day I was on my way home from work when the most remarkable thing happened. Traffic was heavy as usual, and as I sat there at a red light, out of nowhere a bird slammed into my windshield. If that wasn't bad enough, the poor creature got its wing stuck under the windshield wiper.

Just then the light turned green and there I was with a bird stuck on my windshield. Without any other apparent options, turning on the windshield wipers seemed the only thing to do. It actually worked.

On the upswing, the bird flew off, and here is the crazy thing ... it slammed right into the windshield of the car behind me. No, it didn't get caught under the windshield wipers of that vehicle, but the car behind me was a police car.

Of course, knowing my luck, immediately the lights went on and I was forced to pull over. The officer walked up and told me he saw what had happened at the light. Trying to plead my case fell on deaf ears. He simply stated: "I am going to have to write you up for flipping me the bird."

Thanks to Stu Greenwood AB7BA, from Giggle Hertz in the November 1998 issue of Radio Flyer.

The DXer's Creed

In the Light of Day, and Dark of Night,
I'll crank my power full to the right,
To show my RF strength and clout,
And repeatedly my callsign shout!

Because I must, I must divine,
If in Lord Howe I'm 5 and 9!
And in Tonga, Gabon, Mayotte,
I need to know my signal's hot!

3B9 and VU7,
Send me straight to DX heaven!
Calls from lands oh so exotic,
If I miss them, I'll go neurotic!

To snag the rare ones, I'll use each trick:
I'll skip work, I'll call in sick!
I'll miss birthdays and traditions,
Just to work DXpeditions!

And when my family members whine,
I'll say, "Hang on, there's VQ9!"
But should I incur some wifely wrath,
I'll just cry, "Not now! Ten's hot long-path!"

To keep my rep as pile-up buster,
I stay logged on the DX Cluster,
And I read each bulletin,
QRZ and Ohio Penn.

And though my money gets swiped by tramps,
I'll keep mailing crisp "green stamps,"
In the hopes my work so hard,
Nets for me a third-world card.

The QSL, the Holy Grail!
The DXer's joy that comes by mail.
And though we prize these souvenirs,
It sure takes long — it seems like years!

With each contact I near my goal
Of DXCC Honor Roll.
And with ev'ry packet spot I'm seein',
I keep hopin' for a North Korean!

And so I'll say, "5-9, 7-3,"
"By the buro's fine by me!"
By Boulder K and Grey-line edge,
I promise here, I make this pledge:

In the Light of Day, and Dark of Night,
I'll crank my power full to the right,
To show my RF strength and clout,
And repeatedly my callsign shout!

Thanks to K5IQ, in the January 2000 issue of The MHDXA Wire.

Microwatt DX

Yes, microwatts, and remember: A microwatt is just one millionth of a watt!

KJ5TF, on his Web site, reports some real beaut DX! 28 MHz: K7IRK contacted A6YPE using just 6 microwatts. 1,300 miles was the distance.

On 21 MHz, the Atlantic was bridged by GØIFK and K1RM back in 1991. GØIFK used less than 40 microwatts to make the 3,200-kilometer contact. Even 160 meters can produce results with microwatts. AA2U contacted CH9ASJ over a 522-mile path with 613 microwatts.

VK4 amateurs figure in the results for an FM contact made on 10 GHz. VK4ZSH and VK4ZNC were able to make contact with just a milliwatt. The distance spanned was 124 miles.

Some Timely Advice ... Free!

Imagine there is a bank which credits your account each morning with $86,400, allows you to keep no balance from day to day, and every evening cancels whatever part of the amount you failed to spend during the day. What would you do? Why, draw out every cent, of course!

Well, everyone has such a bank. Its name is TIME. Every morning, it credits you with 86,400 seconds. Every night it writes off, as lost, whatever you have failed to invest in good purpose. It carries no balance. It allows no overdraft. Each day it opens a new account for you and each night, if you fail to use the day's deposits, it's gone! The loss is yours. There is no going back.

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NEVER SAY DIE

continued from page 4

industries want are cures for these illnesses. These are huge money-makers, and not to be messed with.

I got a particularly good laugh from this nonsense because drug-free cures for these illnesses have already been discovered. They're easy to cure unless you have been so totally brainwashed into believing what doctors say that you refuse to do even a little bit of reading on the subject. The snake oil and quackery are provided by the AMA, FDA, NIH, the medical schools, the insurance and drug companies. The delivery boys are the MDs.

So why is Congress reaching deep into our pockets to fund the space station? Ask the Boeing stockholders, since they'll be getting a lot of the benefit. Ask the companies doing the work for NASA how much their lobbyists had to bribe Congressmen and Senators to get this huge lump of pork to fly. Who says pigs can't fly?

How come the Russians, who never had a lot of money to waste on inconsequentials, spent billions of rubles to loft *MIR?* Their original idea was to build a space station as a spy platform, complete with nukes ... just in case. It was always 100% a military project.

Benefits? Can you find any- one who can name one single scientific benefit that has emerged as a result of research done in our space station, or resulted from work in the Russian stations?

It's nice that the Russians are now our partners in the space station effort. But, according to the PBS report, we're having to pick up the tab before the Russians will do any work on their modules.

The billions for all this doesn't come out of Congress's pockets, just yours ... sucker.

Defense?

Dan Quayle (anybody remember him?) has been wringing his hands over the shrinking of our military might. He frets that in the last decade we've cut the number of army divisions from 18 to 9. The navy has shrunk from 600 ships to 300. The number of air wings from 36 to 18.

Ten years ago we'd built up a military system as part of our Cold War strategy. Considering that the main threat from Russia wasn't a war played with ships, planes, and tanks, but of nuclear annihilation from missiles, perhaps Congress let those old generals and admirals keep to their old habits too long.

History has shown us endlessly that our military leaders have never accepted new technologies without a long, bitter battle. Just like our schoolteachers. And our scientific establishment. And our medical establishment.

How many ships, planes, and tanks did we need to put Saddam out of business? Well, almost out of business, at least for a little while. And our invasions of Haiti, Panama, Somalia, and Grenada? Or our adventure into Yugoslavia?

We're worried about North Korea, Iran, more Iraq, and maybe Qaddafi a little. But these pipsqueaks are more likely to play the terrorist game with suitcase nukes and biologicals, from which no amount of army divisions or navy ships are going to save us.

Then there's China. The communist Chinese leaders are a proven royal pain in the butt. How much the rising tide of capitalism will rock their boat is yet to be seen. And, like our standoff with the USSR, this is most likely going to be another nuke problem, not the number of army divisions we're keeping out of our workforce at public expense.

Nukes are a problem. A big problem. We can spend billions or even trillions developing antimissile defenses, but that isn't going to keep even a small country from smuggling in dozens or even hundreds of nukes. Plus the makings for tons of biologicals. That's a lot cheaper way to deliver the goods than via multi-million-dollar guided missiles (which leave a clear signature telling us exactly where they came from).

Continued on page 57

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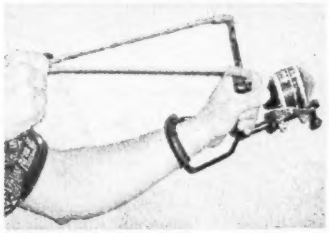

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LETTERS

From the Ham Shack

C. Arnett KD5GGF, Blooming Grove TX. Keep up the good work and the editorials. Someone has to let the citizens of the USA know how the cow eats the cabbage, esp. with that bunch in Washington DC.

I wish you would do an article on one-world government and the Trilateral Commission. You briefly touched on it several months ago, so readers are primed for the truth. If we ever lose our Second Amendment rights you can bet that they will ram one-world government right down our throats. There won't be anything we can do about it when it happens. No Second Amendment means no fight back.

One last thing concerning health. Diet and exercise will cure most health problems, including depression. I was a Type II diabetic, 6', 250 lbs. Disgusting fat body. I had the lifestyle of a neutered domestic house cat. Blood sugar out of control, high blood pressure, high cholesterol, at 36 years of age. I was dead. I just had not fallen over yet. I did the pill thing with the doctor. It sort of worked, getting the sugar under control, but the side effects from the drug were not a good thing. Long-term use was kidney failure and heart problems. I knew I had to do something else. I started reading about diabetes and diet and exercise regimens and applied it to my situation (travel), and made it work. I just turned 39 years. I now weigh 198 lbs, the problems have gone away, and I feel great. The people who are grossly overweight need to pull the feed trough out from under their face and start moving around and doing exercise and most, if not all, of their health problems will go away.

The doctors certainly are not going to push the diet and exercise thing, because it is too simple and will not make them any money. People are very mistaken if they think a pill will make the problems go away. It just masks the problems with a Pandora's box of other problems that will come later from the meds.

Now, to the morbidly obese: "You're dead — you just ain't fell over yet!"

Thanks again, Wayne.

Keep at it, but you need to take off another 30 pounds, at least. The Trilateral Commission? I'm treading on dangerous enough ground with my pushing cold fusion, thus stepping on the toes of the oil, coal, natural gas, nuclear power, solar, wind power, and hydropower industries, plus the $1.5 trillion medical industry, plus NASA's Moon hoax, which has claimed a bunch of lives already. Now you want me to poke the small group that owns and is running the world you know where? No thanks. — Wayne.

Ronald Blaine Fox N9LXX. Amateur Radio is the promotion of goodwill internationally. It truly helps to break down barriers, and open communications between our nation and citizens of other nations. I will never forget talking to a gentleman in the Middle East in 1993, whose country was in turmoil. While he was speaking, I could literally hear bombs dropping in his neighborhood. This particular incident did not involve the United States, however, the amateur to whom I was speaking had concerned relatives in the U.S., and all of their phone communications were down. I can't explain the thrill of being able to call this gentleman's family in Georgia and letting them know that he was OK. A truly emotional experience, even for me, who was only passing a message along. This is just one specific example of the type of international goodwill in which I have been involved. Many others have more glorious stories than I, to be sure.

James E. Cornell KB1GDL. On page 39 of *73*, May 2001 issue, there is a short piece entitled "Take My License — Please!" The two Kentucky hams mentioned, Stephen Anderson, ex-AA8DP, and Charles Puckett KF4ZMG, are both high-ranking members of the Kentucky Unorganized Militia. Unlike most militia groups in this country, who are primarily interested in creating a show of force and solidarity in favor of and protecting Second Amendment rights, this Kentucky group seems actually anxious to provoke an armed confrontation (and they are VERY well armed), with any possible agency of the federal government. Stay tuned, I don't think we've heard the last of either of these fellows. I would be willing to bet that AA8DP is still on 80/75 meters as a communications officer for the K.U.M., and I doubt that a forfeiture notice would faze him. I may start listening on 3.860 to see if I'm right.

Great magazine, from one libertarian to another. Expect a change of address in a couple of months. I'm out of here for central Arizona as soon as I sell my house. 73!

Professor Louis Peasley, State College PA. Mr. Green: My son serves as a Petty Officer 2nd Class nuclear reactor operator on the *USS Alexandria*, a fast attack based in Groton. Before he left on deployment in November, I gave him your book of submarine stories.

Your book was a hit on the boat. Seth left it in the torpedo room (where he sleeps) and the EOW found it. For several days, your book was the topic of conversation among the engineering crew.

Thank you for your sharing all those stories.

Larry WDØAKX, Albert Lea MN. Hi, Wayne. I have enjoyed your mag since I became a ham in '77.

You are always wanting your readers to write with our experiences, so I just had to tell you about the wonderful customer service that I received from Yaesu!

I was experiencing a problem in programming my new FT-7100M, which is a terrific rig, but I couldn't lock out channels in the memory scan. I went to the Yaesu Web site, found the E-mail tech service link, explained the problem, and within 30 minutes I received a reply telling me what to do to correct the problem! According to the site this was even after-hours for replies.

It was a misprint in the manual. I am not used to this good a service so just had to pass that along for what it is worth. I will be buying more of their products in the future because of this!

If only more manufacturers could have tech service this good!

Keep up the good work, Wayne. I have been reading all of the Moondoggle stuff and am also convinced. 73.

Has anyone else had a good customer service experience? Please advise. — Wayne.

Richard Mollentine WAØKKC. This 11-year sunspot peak cycle is less than desirable, although many have had magnificent individual contacts.

We are now going down in sunspots. To alleviate the progress downward and put our best face forward, I'm suggesting it be known as a 5-1/2-year sunspot cycle — or in other words, in 5-1/2 years it will start up again, hopefully much better. 73

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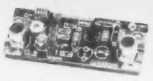

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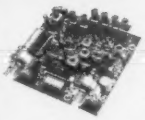

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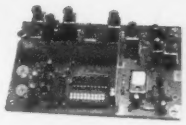

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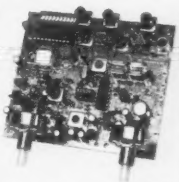

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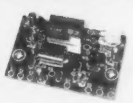

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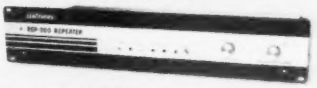

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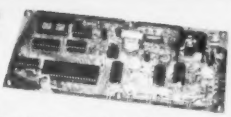

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Amazon Death Flight

When these missionaries — and hams — were shot down, the official apology was too little, too late.

A hail of bullets striking the Cessna 180 ignited a fire in the cockpit, filling it with smoke and flames. Jim Bowers KD4CKM, sitting in the copilot's seat, grabbed a fire extinguisher and tried to put out the flames. But they continued to build behind him, surrounding his wife, Veronica (Roni) Bowers KD4CKN, 7-month-old daughter Charity, and 6-year-old son Cory, sitting next to his mother.

It was April 20, 2001, when a Peruvian jet fighter came up alongside the plane on the right, flew there for a moment, and then disappeared. The fighter then came in from behind and opened fire, spraying the plane and its five passengers and ripping holes in the fuselage and pontoons. A single bullet hit Roni in the back, going through her heart, and entered through the back of Charity's head, instantly killing them both.

The pilot, Kevin Donaldson, had both legs shattered by the gunfire. In the panic of the moment he shouted into the radio, telling the control tower at the Iquitos Airport in Spanish that "They are trying to kill us." He frantically dove the plane toward the Amazon River, as he knew he had to land — and quickly. The river is two miles wide at the point where they crash-landed.

Without the use of his legs, Kevin was unable to keep the plane from hitting the water hard. However, the craft still managed to stay afloat for a short time. The Peruvian fighter came in for the kill, and sprayed the plane with bullets again. Jim opened the door, and the intensity of the fire increased. He got out of the plane and reached back to pull Cory to safety. He then went back for his wife and daughter. Once they were out of the plane it started to roll over and sink. Jim and Cory hung on to the pontoon while trying to keep Roni and Charity from floating away.

The water was on fire, as flames from the cockpit ignited the gas spilling from the ruptured wings. Kevin, the pilot, tried to get out of the cockpit, and discovered his right leg wouldn't work when he tried to step on the pontoon. He fell off into the blazing inferno and fought valiantly to splash and force the flames back from him as he swam around the plane calling for Cory to get on his back.

Photo A. *Jim Bowers, Roni, Charity, and Cory. Photo by Daniel Enck.*

Jim and Cory were also splashing to keep the flames away from them. Finally the gasoline burned out and the smoke cleared, leaving visible the scene of their plight in the middle of the Amazon River. The survivors clung to the pontoons for a half-hour, until a native from a village upriver came in his canoe to rescue them.

The Peruvian government said that the fighter pilot thought they were drug runners and tried to warn them to land. Kevin apparently never heard the warnings, as he was getting his landing instructions from the tower to land at Iquitos.

A U.S. Embassy official said that a U.S. surveillance plane monitored Peru's downing of the plane carrying the American missionaries. "There was a U.S. government tracking aircraft in the area in support of the Peruvian intercept mission. As part of an agreement between the U.S. and Peru, U.S. radar and aircraft provide tracking information to the Peruvian Air Force on planes suspected of smuggling illegal drugs in the region. The U.S. aircraft are unarmed and do not participate in any way in shooting down suspect planes," he said.

Jim and Roni Bowers were missionaries traveling along the Amazon visiting villages and establishing churches. Amateur radio was a vital link for them. When one of them would go ashore and the other stayed behind, they used two meters to keep in contact.

The Amazon River, and a metal houseboat with a metal roof, provided an excellent reflective surface for the Cushcraft R5 vertical antenna Jim and Roni used on the low bands. Jim was using the same Kenwood TS-430S transceiver that his father, Terry Bowers WB8PAP/PP8ZAN, had used when he himself was in the missionary field in Brazil.

Starting in 1963, Terry Bowers and I had communicated two to three times a week while running phone patches back to family, friends, and supporting churches here in the States. We would meet on the Halo net on 15 meters and then move off to a quieter spot to talk. We would often go to 10 meters and have excellent contacts when the band was devoid of any signals. Ten meters would be open, but no one was listening.

Photo B. *Here is the Bowers' houseboat, with a Cushcraft R5 not too visible on the roof. Photo by Daniel Enck.*

Jim and I ran phone patches for a while, but the age of computers had made newer technology available that could get the job done faster. Using Pactor, Jim was able to send and receive E-mail at his leisure. He had to run the onboard gasoline generator for power, and with the high cost of gasoline he only ran it when he needed to. It wasn't the same, but still everyone could communicate with them.

The radios on the houseboat are now silent. Jim has returned to the States and may not return to the Amazon. He is staying with family and trying to put his life back together for himself and his 6-year-old son Cory. We communicate by telephone and E-mail, but no longer by ham radio. Thirty-eight years of communicating with the Bowers family by amateur radio in South America have now come to an end. 73

If you're a No-Code Tech, and you're having fun operating, tell us about it! Other No-Code Techs will enjoy reading about your adventures in ham radio—and we'll pay you for your articles. Yes, lots of nice clear photos, please. Call Joyce Sawtelle at 800-274-7373 to get a copy of "How to Write for *73* Magazine."

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"CQ ET!"

The UFO Watchtower DXpedition.

Located in south central Colorado at almost 8,000 feet above sea level, the San Luis Valley is the highest Alpine valley in the world. This valley is bordered by some of Colorado's highest peaks, many of which are over 14,000 feet. The valley provides a beautiful vista surrounded by snow-capped peaks even in the spring and fall, with a high and dry climate and 350 days of sunshine a year.

In 1708, Juan de Ulaterri claimed the San Luis Valley for Spain. Long before his arrival, the local Indians knew the place as Peaceful Valley. The Ute Indians considered the valley a holy place, and some of the Pueblo tribes considered the valley a Place of Emergence.

Spanish farmers and ranchers have lived in the valley since the 18th century. This high-plains valley, like the plains in the Andes, is famous for potatoes and other produce that favor this elevation and climate. This valley is also known for its "high strangeness."

Stories of supernatural phenomena abound in this naturally spectacular 50-mile-wide by 125-mile-long valley, surrounded by the San Juan and Sangre de Cristo mountains and location of the Great Sand Dunes National Monument.

Ancient Native American traditions exist telling of the existence of underground "ant people." There is also the case of a "bilocating nun" who seems to have astral-traveled to the valley in the 17th century, converting many of the Native Americans to Christianity. The native tales of the phantasmal "blue lady" were brought back to Spain and saved Sister Marie de Jesus from being declared a witch.

***Photo A.** CQ ET station.*

Modern strangeness

Modern high-strangeness in this valley gathered public attention in 1967 with the sensational animal mutilation of Snippy the horse. The reports of strange lights and craft have continued to put the valley in the limelight, with many modern-day sightings.

In 1995, a daylight video of a huge craft "at least a mile in length" was made by a Salida, Colorado, resident and publicly shown on the Paramount Television program "Sightings." Many locals have reported seeing strange craft approach, then disappear into the mountains. Reports also abound of strange underground noises such as

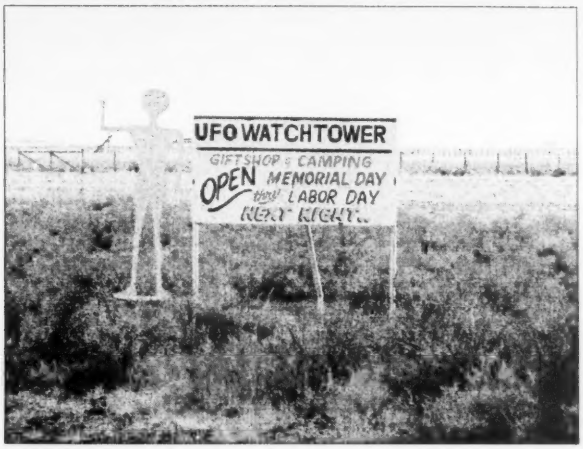

Photo B. *Watchtower welcome.*

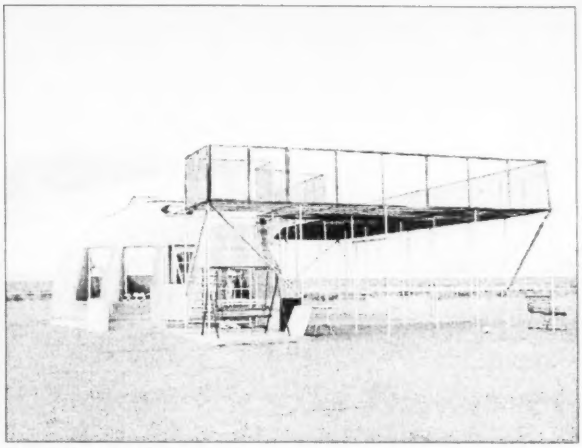

Photo C. *UFO Watchtower.*

humming and rumbling. In all, the "high-strangeness" of this valley has attracted the attention of researchers of and those interested in the unexplained.

Now they really will get strange

What does all this have to do with ham radio, you are by now asking yourself? If you have an interest in the unexplained, or are an "interesting QSL" hunter, then this upcoming DXpedition is for you.

Having an interest in the unexplained myself, I have decided to commence on a series of DXpeditions to the areas of unexplained happenings in the United States. The first DXpedition will be to the UFO Watchtower in the San Luis Valley of Colorado. The Watchtower is located about 22 miles North of Alamosa CO, and about 220 miles southwest of Denver CO.

In order to check out the possibility of a DXpedition to this and other locations, I set out for a mini-test of the environment, rig, operator, and motor home. Braving snow-covered passes and high winds in early April, crossing the Colorado mountains in a motor home is no task for the faint-of-heart.

Upon arriving in the valley, the operations team — consisting of me and a friend who is presently studying to be a ham — found our way to the UFO Watchtower, which is located about two miles north of Hooper CO near, of all things, an alligator farm. Do the ETs like gator?

We set up a G5RV (a motor home is an RV, so the antenna seems appropriate), and connected it to my trusty old Kenwood 440S. Even though the test was unannounced and we had to brave high winds and constant sandstorms, we managed 30 contacts during our weekend test. The photos show an area that is literally in the middle of nowhere, a remote area just right for "high strangeness."

The "official" DXpedition will occur over the Labor Day weekend (September 1–3) and the frequencies listed will be used as the spot frequency plus or minus QRM. Give a call, or listen, and you may be the one to hear first-hand descriptions of any strange happenings that may be encountered!

QSL cards should be sent to my *Callbook* address and include an SASE large enough for an 8-1/2 by 11 QSL.

Where and when will the next DXpedition be? I'm thinking Roswell! Keep watching *73* for details!

Frequencies of operation

All frequencies will be ± QRM. 75 meters = 3853. 40 meters = 7237. 20 meters = 14310. 17 meters = 18150. 15 meters = 21385. 10 meters = 28510. 73

Photo D. *UFO crash at Hooper, CO.*

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The Wall-Wart Bible

Say "Amen!" to this treatise on troubleshooting these ubiquitous supplies.

Because failure of electronic equipment is often traceable to a failure of the power supply, it is helpful for the radio amateur to have an understanding of some rudimentary troubleshooting techniques for simple supplies.

The job of the "power supply" in consumer-electronic equipment is to convert the 120 VAC of the power line to low-voltage DC, which is required to operate the equipment. There are also safety factors involved, such as a fuse. The final DC output voltage must be fairly "pure" or "clean" — in other words, free of AC "ripple" components. Finally, sometimes the power supply must have extra efforts made at "regulating" its voltage value.

We can draw a block diagram showing the stages or steps involved in the action of the entire power supply (**Fig. 1**). The transformer, and usually some of the other components, is often housed in a plastic container that is designed to be plugged directly into the wall outlet. This box hangs from the outlet and is often nicknamed a "wall-wart." **Photo A** illustrates a typical "wart." Yes, wall-warts may be ugly, but in defense of this technique, they are an inexpensive way to construct the power-supply housing, and the equipment is smaller and lighter as a result.

One of the challenges in testing power supplies that use the wall-wart technique is that it's often not immediately obvious how much of the whole power supply is in the box, and how much of it is mounted inside the equipment that it powers. In other words, sometimes the wall-wart contains only the fuse and transformer; sometimes the diodes are in it as well; sometimes the capacitor is, too; and occasionally a regulator might be, also. Hopefully, the label can be read to interpret what's inside. There are these possibilities:

1. If it's just a transformer, the output will be low-voltage AC, point 1 in **Fig. 1**. To test a wall-wart made this way, plug it into the wall outlet and check its output with an AC voltmeter (a multimeter set on VAC works fine). The meter should read a little higher than the label rating, if no load is connected.

2. If the rectifier is included with the transformer, but no further components, the output will be at point 2 of **Fig. 1**, and will be rough low-voltage DC. Check it with a DC voltmeter, but realize that the voltage may check quite differently than what is labeled, because the filter capacitor isn't present when you test just the wall unit and meters respond differently to rough DC. Either higher or lower readings than the label value might be observed; about all that can be determined

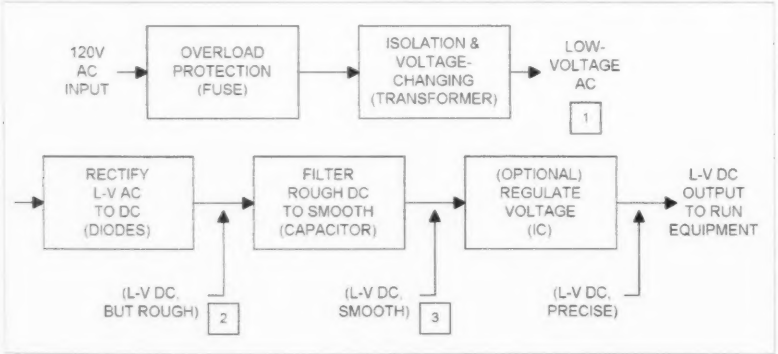

Fig. 1. Block diagram of a typical power supply.

is that the unit produces "in the ballpark," or not at all. Whether or not the supply is connected to a load will produce variation in the output, too.

3. If the capacitor is also included, the output will be nearly pure low-voltage DC, at point 3 of **Fig. 1**. Check it with a DC voltmeter, but realize that the voltage will undoubtedly be higher than labeled because the equipment isn't loading down the capacitor's peak voltage. Capacitor filters with no load have considerably higher output voltage than when fully loaded.

4. It's not too often that a voltage-regulator is included in the wall-wart, as space is limited. Sometimes, however, in larger boxes, they might be included. If that is the case, the output should be very pure low-voltage DC and very close to what is labeled.

The presence of an internal capacitor or regulator within a DC supply is usually not evident from the label. Of course, an oscilloscope can be used to determine if the output waveform is filtered or not. Though a very powerful instrument, it's not always convenient to use an oscilloscope.

It's fairly easy to determine the presence of a capacitor, however, using just a DC voltmeter. Measure the power supply's output with no load, and then unplug the supply while continuing to monitor the voltage. If no capacitor is present, the output voltage will drop to near zero in less than a second after being unplugged. If a capacitor is present, the voltage will drop much more slowly. It will also be considerably higher than the label value, unless there's an internal regulator. Incidentally, keep these principles in mind when checking a wall-wart that's supposed to have a capacitor inside. If it produces output that is too low in voltage and drops to nearly zero very quickly after being unplugged, the capacitor might be open (bad). A variation of this — a unit that is labeled for voltages when connected to an external capacitor — is shown in the examples of real units that follow.

Occasionally, a supply may test OK into a meter, but may still not work properly when hooked to the equipment. A bad connection or an open diode in a multiple-diode rectifier arrangement can produce misleading information of this type. A better test would be to rig up a dummy load to simulate how the equipment pulls operating current from the supply. A light bulb of about the proper voltage rating and a current draw equal to or somewhat less than the rated current of the supply is a good load, and gives visual indication of what's going on as well. If a suitable resistor load is available, that's fine also. Use Ohm's law to figure the proper resistor load: R (ohms) = V (volts) / I (amps). If the supply is rated in mA, first convert to amps by dividing the mA rating by 1,000. Also make sure that the resistor you use for the dummy load has enough power rating: Calculate the power rating needed using P (watts) = V (volts) x I (amps). In nearly all cases, the common 1/4-watt

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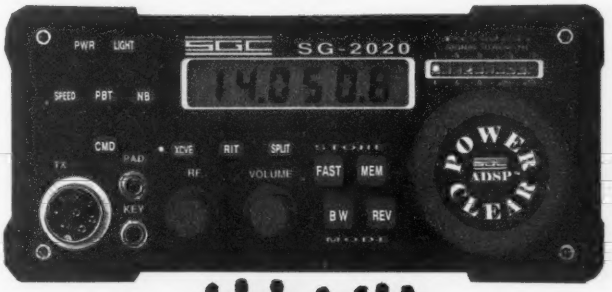

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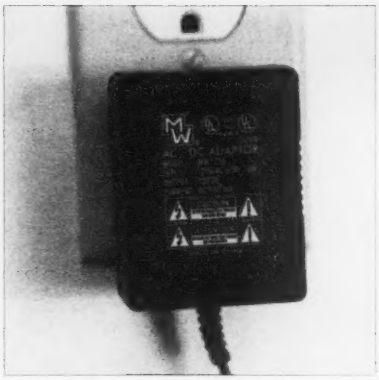

Photo A. *A typical "wall-wart" power supply.*

resistor won't be enough, and would go up in smoke if used. A resistor of any power rating above what is calculated is fine. For example, to test a 12 VDC, 500 mA power supply under full load would require a resistance of 24 ohms, with a power rating of 6 watts or more. If you don't have the calculated value of resistance for an exact full load, use something higher in resistance. For the above example supply, if you had a 50-ohm resistor handy, it would load the supply to about 240 mA, according to Ohm's law. It would need to have a 3 watts or greater power rating. This load might be adequate to reveal any serious problems in a suspected supply, even though it's not a "full" load.

Usually, these wall-warts are sealed up and no internal repair is practical. However, one that is snapped together or assembled with screws may be opened, and a repair can be attempted. The "fuse" might not be obvious, because it is often hidden inside the transformer windings. It might even be just a section of smaller wire connected from the plug to the transformer. Often "thermal" fuses are used. These devices have a distinctive bullet-shaped silvery case. They open in response to high temperatures more than to current overloads. They should be replaced by using a replacement of the same temperature rating, which is usually marked on the case. Diodes can be replaced fairly easily, though you may not be able to identify the original diode type number. A general-replacement type diode can nearly always be used. To simplify this, just choose a diode of sufficiently higher current and voltage ratings than the supply. I usually use replacement diodes with 200 or 400 volts PIV rating; they cost hardly any more than 50-volt diodes and provide a higher margin of safety. Type 1N4004 (1 amp, 400 PIV ratings) works fine for most LV supplies up to 800 mA or so. ECG125 (2.5 amps, 1 kV) is fine, too, though I don't push that current rating.

Sometimes a wall-wart problem is external and easily repairable. If a sealed supply tests bad, examine its output wire for breaks before discarding it. Sometimes the failure is there, and splicing in a replacement wire or connector might be acceptable. The most likely areas for failure are where the wire is stressed the most, such as

Name	Ratings	Cap?	No-load Voltage	Full-load Voltage	Primary resistance
AC Adaptor AE-2086	10 VAC, 500 mA	n/a	12.2 VAC	10.3 VAC	190Ω
Yaesu NC-28B Battery Charger	8.7 VDC, 60 mA	No	11.6 VDC	8.0 VDC	620Ω
AT&T Model DV-7520	7.5 VDC, 200 mA	Yes	11.4 VDC	7.95 VDC	335Ω
Realistic 19-1120	12 VDC, 100 mA	Yes	16.2 VDC	12.5 VDC	452Ω
MW 1250	12 VDC, 500 mA	Yes	19.5 VDC	12.1 VDC	180Ω
AU48-120-120T	12 VDC, 1200 mA	No	14.8 VDC*	9.87 VDC*	52Ω

Table 1. *Measurements of typical units. *This unit does not have an internal capacitor, but evidently relies on one being present in the equipment to which it is connected. With a large (2200 µF) capacitor connected externally, its output voltage is 19.9 VDC without load, and 12.1 VDC fully loaded. The label doesn't reveal all details.*

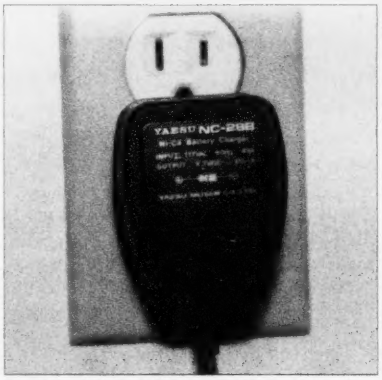

Photo B. *A wall-wart used as a battery charger for a Yaesu handheld radio.*

the point where the wire joins the case or at the other end near the connector. The wire conductor can break inside the insulation with very little outside visual evidence, so this can be hard to spot. Wiggling the wire while measuring the output voltage, or observing the equipment for response can sometimes reveal the area of the break. A wire break near the connector will probably require that a new connector be purchased and soldered on. See the section near the end of this article for a discussion of typical connectors.

A quick check can be made to see if a supply failure is on the input side or output side: use an ohmmeter set on a moderately low range, say 2k ohm, and probe across the 120 V prongs (with the supply unplugged, of course!). If the fuse and transformer primary winding are good, you'll see a resistance indication of between about 50 ohms and 1,000 ohms. If that's the case, the problem may well be in the output wire or connector, which would be something you can fix even if the supply is sealed. If the resistance across the 120 V prongs is above 2,000 ohms, then either the transformer primary or the fuse is probably open, and unless the supply can be disassembled, there's not likely anything you can do to repair it. If the primary tests good and the output wire seems good also, it's possible that the transformer secondary or the diodes or capacitor (of a DC supply) have failed. With a sealed supply, that's also a difficult situation to fix.

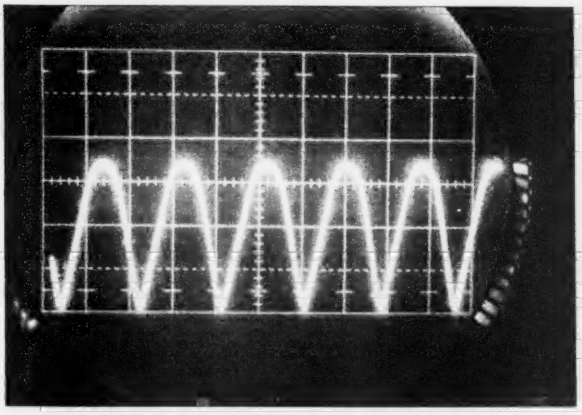

Photo C. *The no-load output waveform of the battery charger of* ***Photo B****. Vertical scale is 5 V/div, indicating about 17 Vpk; the effective DC voltage as read by the DMM was 11.6 V. Unfiltered 120 Hz ripple is evident.*

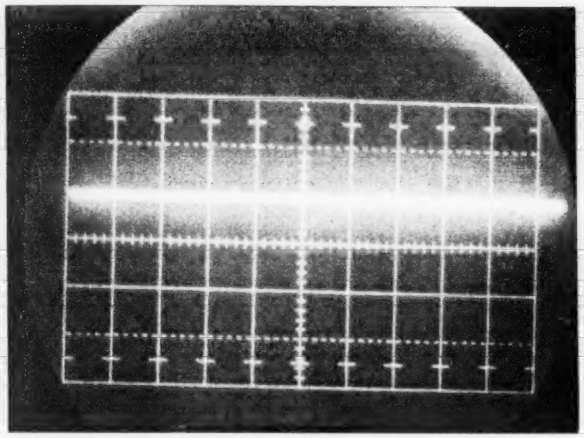

Photo D. *The output waveform of a filtered power supply shows 19.5 V of essentially pure DC, with no ripple. The oscilloscope settings are the same as for* ***Photo C****.*

If you're replacing an output wire or connector, or using a different supply as a replacement, remember that DC supplies must be correctly polarized; hook it up backwards and the equipment will likely burn up! The label information will usually indicate which connector pin is positive. If not, use a voltmeter to determine. There's usually no polarity problem for AC outputs.

Remember that usually some portion of the power supply is in the equipment, and some in the wall-wart. Even if the wart part is good, you can still have problems in the equipment portion of the power supply. Therefore, if power supply problems are still indicated (a completely "dead" set, for example), you will need to troubleshoot the other components: the rectifier diodes (if in the equipment), capacitor, regulator, and wiring. Inside the equipment may also be another fuse, or a fusible resistor; and another frequent source of problems to look for is at the power-supply connector inside the equipment. Here, the stress and movement of the power-supply wire often causes a fatigue failure of solder joints on the connector. Resoldering may be all that is required to effect a repair, in this case.

To illustrate the principles discussed above, measurements were made on some real wall-warts and are given in **Table 1**. The unit of **Photo B** is a battery charger for a hand-held radio; its output is unfiltered, as the oscilloscope display of **Photo C** clearly shows. This is typically the case for chargers, as contrasted with power supplies, which do often contain the filter capacitor. A charger may also contain current-regulating circuitry, but often they are no more than a simple DC unfiltered supply, like this one. To see the contrast, **Photo D** shows the nearly pure DC output of a filtered supply, the MW1250. This waveform is with no load; however, some ripple would be evident under load.

Notice how much the voltage varies between the no-load and the full-load condition for the power supplies of **Table 1** that include a capacitor filter. In fact, the power-supply voltage rating for DC supplies is not very precise at all. Keep this in mind if you are selecting a wall-wart as a replacement or as a power supply for a project you're building: The labeled voltage is very approximate, unless a voltage regulator is included. Make sure that your equipment can handle the possible range. Finally, also notice in **Table 1** that the primary (input) resistance is considerably lower for the higher-power units.

At least a brief mention should be made about connectors often used with wall-warts. See **Photo E** for some typical connectors used. The most popular style is a hollow "barrel" connector (also known as a "coaxial" power connector), as shown in the leftmost two units of **Photo E**. Both

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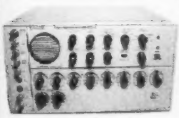

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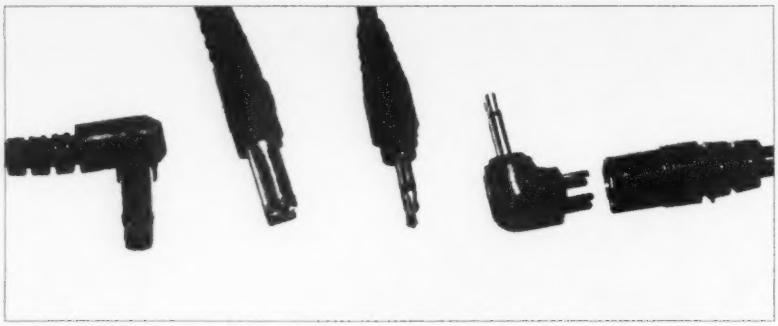

Photo E. *Typical wall-wart output connectors. The two units to the left are "barrel" types. The next style is a 2.5mm subminiature phone plug. The unit shown on the right is a 2.5mm plug provided on a reversible-polarity adapter to the wall-wart.*

Outer diameter — mm (in.)	x	Inner diameter — mm (in.)
2.5 (0.098)	x	0.75 (0.030)
3.0 (0.118)	x	1.0 (0.039)
3.5 (0.138)	x	1.35 (0.053)
4.0 (0.157)	x	1.70 (0.067)
5.0 (0.197)	x	2.10 (0.083)
5.0 (0.197)	x	2.50 (0.098)
5.5 (0.217)	x	2.10 (0.083)
5.5 (0.217)	x	2.50 (0.098)

Table 2. *Common hollow-barrel connector sizes.*

the outer diameter of the plug barrel and the inner diameter (of its hole) must be matched when replacing. You'll find that 5.0mm x 2.1mm is a common size for amateur accessory equipment. The dimensions may be specified in decimal inches for some replacement units, but metric is more common. The most accurate way to measure the outer diameter is by using a vernier caliper or a micrometer, though careful use of a metric ruler may be workable for the larger sizes. The inner diameter is trickier to determine, since it's recessed and so small. A technique I've found useful is to use the shaft end of small drill bits to gauge the inner size. A 3/32" bit is 0.093" decimal or 2.38mm; 5/64" is 0.078" decimal or 1.98mm; and 1/16" is 0.0625" decimal or 1.59mm. By estimating the looseness of fit, generally the standard metric diameter can be determined. Numbered drill bits and solid bare copper wires are other useful probing devices, and provide other sizes. **Table 2** lists some common standard sizes used with these barrel connectors. There are others, of course.

Remember that with DC supplies, using correct polarity is critical. These connectors may be installed with either polarity — sometimes the inner conductor is positive, sometimes it's negative. The wall-wart labels usually state the polarity used.

Miniature phone plugs are sometimes used on wall-warts. These look just like standard earphone plugs. The two standard sizes are "miniature" (3.5mm in diameter, sometimes quoted as 1/8") and "subminiature" (2.5mm in diameter and sometimes stated as 3/32"). A subminiature connector is shown in **Photo E**. Again, DC polarity must be matched, but it's much more common to find the tip positive with these plugs.

Because of the proliferation of different supplies and connectors, some vendors now provide replacement wall-warts with a reversible two-pin intermediate plug that is intended to be used with an adapter that terminates with the connector needed on the equipment. Such a device is shown in the right of **Photo E**, terminating in a subminiature plug in this case. You replace a faulty supply in three steps using this scheme: (1) select the wall-wart to match the electrical requirements of your equipment; (2) select the adapter that mates with your equipment's power connector; (3) properly orient the adapter onto the two-pin supply connector to provide the proper DC polarity to the equipment.

Of course, there's the occasional oddball proprietary connector to deal with. Here, your only choices are to purchase an exact-replacement supply from the original manufacturer, or to cut off the original connector and splice its leads into the output leads of a replacement. DC polarity will probably have to be matched by testing with a voltmeter, if the latter approach is taken.

Hopefully the information presented in this article can help you troubleshoot a suspected wall-wart power-supply failure to determine the actual cause, and repair it if possible. If necessary to replace it, a good understanding of the different power-supply types and characteristics should make selecting a suitable replacement straightforward. As reference to **Table 1** indicates, the label of a wall-wart gives only approximate values, so remember to make proper measurements to confirm the actual ratings of a possible substitute replacement. 73

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Return of the Wavemeter

Nostalgia? Fun project? Or both?

Wavemeters date back to almost the beginning of time, or at least it seems that way. They at least date back to the first "receiver" that was used to detect a spark from the first known transmitter.

Although ancient in years of use, the wavemeter was the staple of ham radio test equipment up until the time frequency counters became affordable. Although superseded by counters, the wavemeter is still an important and inexpensive piece of test equipment that shouldn't be ignored.

A wavemeter is an independent resonant circuit that can be used to verify the band at frequencies upon which a transmitter is operating. Being independent, it can be counted upon to provide accurate results, or a "second opinion" in case of a general frequency or band dispute.

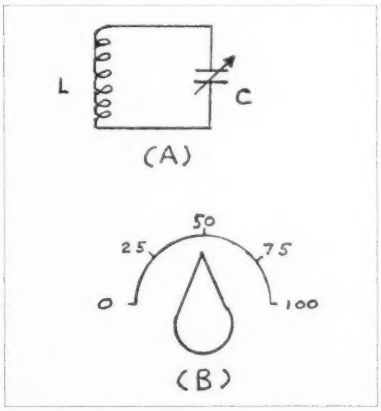

***Fig. 1.** (a) Basic circuit of a wavemeter. Values for L and C are selected for resonance at the desired band of frequencies. (b) Typical knob and dial used with a wavemeter. Dial is normally calibrated in increments of frequency.*

Wavemeters come in many forms, with a few selected types being discussed here, but each performs a similar function — resonates at a given frequency.

Any resonant circuit may be used as a wavemeter to "measure" the band of frequencies upon which a signal is being generated. When coupled to a signal source, it will absorb RF energy at the frequency of resonance. Being a "linear" device, it will not resonate on harmonics of a fundamental signal, unless the fundamental signal is loaded with harmonic energy. Nor will it distort a signal causing the wavemeter to indicate an erroneous frequency.

As a ham, why would you be interested in using or having a wavemeter available? The answer is best left to you as a ham experimenter. However, wavemeters are a "basic" tool that can be used for determining a band of frequencies upon which a signal is being generated. Suppose that you do not have a counter available and you've just built up an oscillator and buffer amplifier. How will you determine the band of frequencies upon which it is operating? You'll need some kind of a detector and a frequency band reference measurement. Of course, if the oscillator is crystal-controlled, you'll know the frequency and the multiplication factors for the desired harmonics. But on which harmonic is the circuit tuned? A wavemeter comes to the rescue because it will respond only to the dominant output harmonic that the circuit is producing.

As you can see from the above example, a counter would probably give you the frequency, and accurately too, but sometimes the counter can become confused when there is too much harmonic energy in the signal or if the

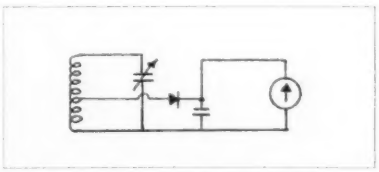

***Fig. 2.** Wavemeter utilizing a diode detector and a meter to indicate circuit resonance.*

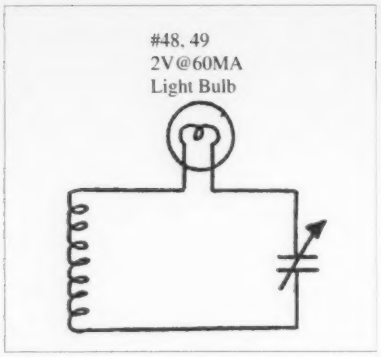

Fig. 3. One of the earliest methods used for indicating resonance of a wavemeter was to employ a light bulb. The bulb's glow was dependent upon the circulating current flow.

level is incompatible with the counter's input circuit. Again, the wavemeter to the rescue as it will pick out the most predominant signal amplitude. The wavemeter provides a second opinion, so to speak, and provides confidence in one's judgment. A wavemeter is a passive resonator and will always "display" the correct band or frequencies should there ever be a question.

Wavemeters come in just about any package and mechanical size that you might consider. An old grid dip oscillator makes a really nice wavemeter when the oscillator has been turned off — and comes with calibration marks, too! There is no limitation to the frequency band where a wavemeter may be operated. Remember, it is only a resonant circuit with the elements tuned to the desired band of frequencies. The basic circuit is shown in **Fig. 1,** and it applies to all wavemeters regardless of size, shape, or material. Also shown in **Fig. 1** is a typical dial that is attached to the wavemeter that can be marked off in increments of frequency.

In use

When a wavemeter is used, it is brought near an active circuit that is to be checked. When tuned to the same frequency as the circuit being tested, energy will be absorbed by the wavemeter and the calibrated pointer will indicate the approximate frequency of the signal being measured.

Sometimes it is difficult to mechanically place the resonant circuit close to the circuit being tested. When that happens, a long coupling link or a short length of coax with a 1–5 turn pickup loop on both ends may be used to couple energy from the circuit being tested into the wavemeter. The caveat of using the coax is that it too can become resonant and create a false frequency indication. Care must be taken to avoid that possibility.

To obtain an indication of energy being absorbed, one of several techniques may be employed. The easiest method is to attach a diode detector to the wavemeter and allow the detected signal current to operate a meter (see **Fig. 2**). The meter will indicate an increase in diode current based upon resonance and the strength of the detected signal. The completed circuit is essentially the same as a field strength meter except that an antenna is not used — although an antenna may be added.

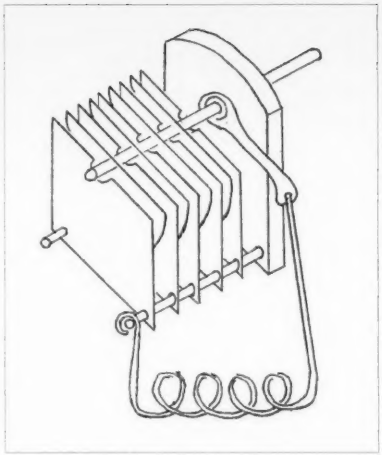

Fig. 5. A coil and variable capacitor connected to form a resonant circuit to be used as a wavemeter. A pointer knob may be mounted on the capacitor's shaft. A calibrated frequency scale may be mounted on the capacitor's mounting plate.

Another method is to detect the signal absorption in the circuit being tested. There is usually some form of metering within the circuit that will indicate when energy is being absorbed from that circuit.

One of the early indication methods used was to place a low current dial light in series with the coil and capacitor (see **Fig. 3**). The light bulb would glow based upon the magnitude of the circulating current within the resonant circuit. In use, the coupling was the least amount necessary allowing the lamp to glow dimly.

Lecher Wires

Perhaps the next oldest wavemeter is the Lecher Wire system shown in **Fig. 4**. It works on the same principle as a coil and capacitor absorption wavemeter except that it is a section of open wire transmission line having a length exceeding about two wavelengths at the anticipated frequency of operation. 300-ohm TV twinlead works well in this application even with the insulation remaining on the wire.

A transmission line is a system of

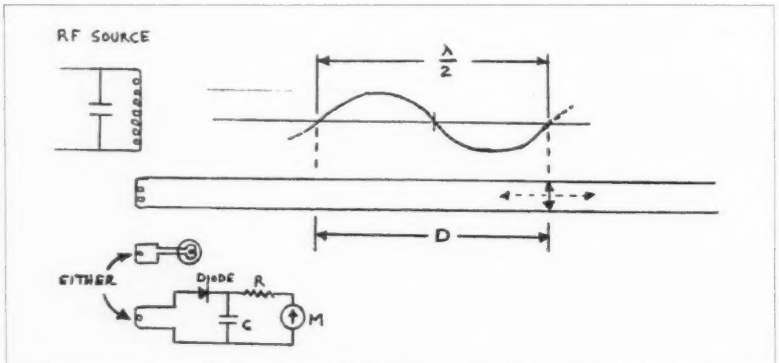

Fig. 4. Lecher Wire system used for determining the relative frequency of a signal source. Detection of the signal null may be done using either a light bulb or a field strength meter. The detector circuit is located on the opposite side of the Lecher Wire pickup loop in order to create the greatest amount of field amplitude change. D in meters: F(MHz) = 150/D. D in inches: F(MHz) = 5905/D.

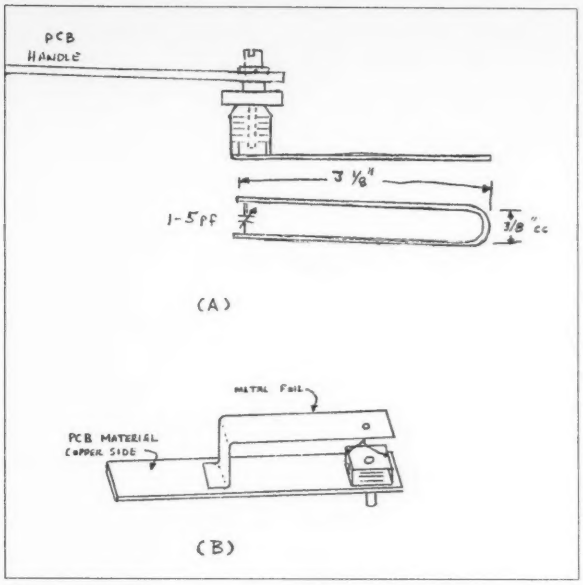

Fig. 6. VHF/UHF wavemeters: (a) Horseshoe resonators made from heavy copper wire (#10-#14) with dimensions shown for the 450 MHz band. (b) Horseshoe resonator made with metal foil mounted on a piece of printed circuit board material.

distributed inductance and capacitance, while the basic wavemeter is lumped inductance and capacitance. The two systems perform the same regardless of their mechanical configuration differences.

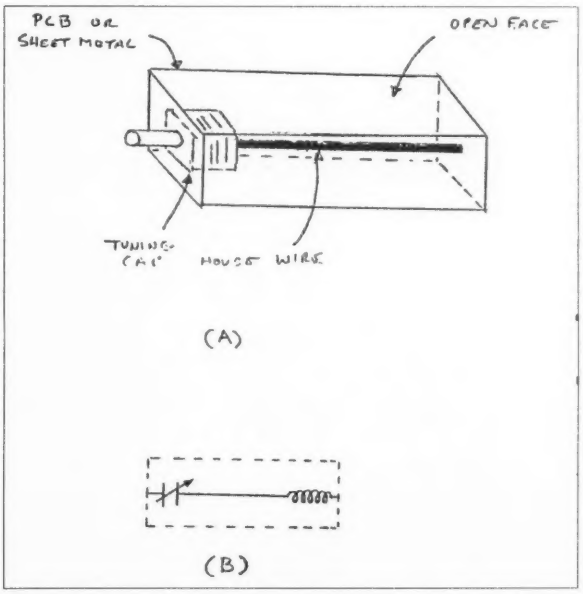

Fig. 7. Pictorial view of a channel resonator used as a wavemeter. (a) A straight wire resonator allowing the circuit to resonate at the highest frequency. (b) A coil may be added to the cold end of the resonator to lower the frequency of a given channel. Notes: Box length contributes to operational frequency. Line length and cap value determine frequency.

One of the advantages of the Lecher Wire system is that it can be utilized well up into the microwave region, though a little tough to use at short wavelengths. Typically, when operating in the microwave region, it is better to shift the configuration to waveguide where small mechanical dimensional changes can be observed/measured more accurately.

Normally, energy on a transmission line is traveling from the source to the load and standing waves on the line are not desirable. In the case of a Lecher Wire system, a short is deliberately placed across the wires to create standing waves. A shorting bar placed across the line is moved along the line creating distinct peaks and nulls (standing waves) on the line. When using TV twinlead, a screwdriver shaft laid across the line functions well as a "short."

By measuring the distance between half-wave length peaks or nulls on the line, one can determine the approximate frequency of operation. Actually, frequency of operation can be determined rather

Continued on page 22

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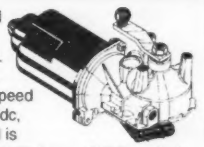

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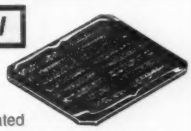

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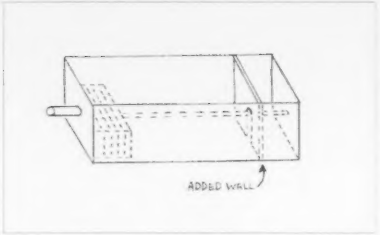

Fig. 8. Channel resonator with an added wall used to shorten up the channel length with the intention of raising the frequency of resonance. The wall must be soldered to the wall and resonator wire to maintain stability.

accurately with Lecher Wires. The equations for determining frequency are shown in **Fig. 4,** with measurements taken in either inches or meters.

Detecting the absorption of energy at the half-wave points can be done in several ways as shown in **Fig. 4,** with the metering technique being the most sensitive. The light bulb technique is perhaps the oldest method used and is effective as long as the signal source generates sufficient energy to light the lamp to a minor brilliance.

Coil and capacitor

The easiest wavemeter to build is one where a coil and capacitor are connected as shown in **Fig. 5**. The table shown provides typical inductance and capacitance values suitable for the various ham bands from 160 meters through 450 MHz.

Mechanical construction of the wavemeter is based primarily upon the selection of a capacitor. The simplest mounting for the capacitor is to fashion a handle using a wooden paddle or a short section of printed circuit board material.

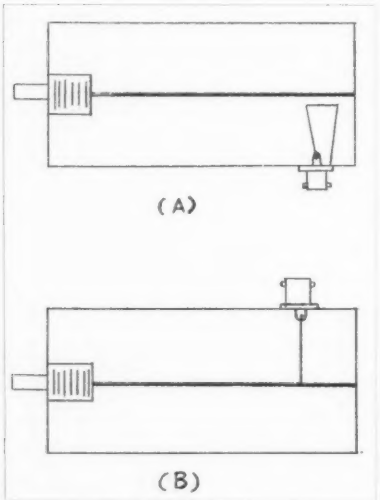

*Fig. 9. Methods for adding a coupling link to a channel resonator. **(a)** Link is coupled to the side of the resonator and is positioned for a desired coupling factor. **(b)** Link is tapped directly on to the resonator. Tap is positioned for a desired coupling factor and impedance value.*

Horseshoe resonator

When operating above about 2 meters, the lumped inductance of a coil becomes small enough such that it becomes mechanically easier to form the inductor into a loop like a horseshoe. The actual circuit then becomes a combination of distributed inductance and capacitance connected to a lumped capacitance. The horseshoe configuration is usable at frequencies from 2 meters up to perhaps 900 MHz. At the higher frequency end, the lumped capacitance begins to hinder the desired operation and shifting to microwave techniques is preferred.

Fig. 6a shows a typical loop soldered to a variable capacitor for use in the 400-500 MHz band. The loop is made of #12–#14 copper house wire, and may be used with or without insulation on the wire. The use of insulation will prevent the loop from actually making electrical contact with the circuit being tested.

Fig. 6b is another form of the horseshoe. In this case, the variable capacitor is mounted onto a section of printed circuit board. The loop portion is a strip of copper or any solderable material that is formed to create a loop as shown. The frequency coverage of this configuration can essentially be from 2 meters to 900 MHz. The frequency of operation is dependent upon the capacitance value and the length of the "loop."

Channel resonator

The channel resonator is an interesting wavemeter because of the construction as shown in **Fig. 7**. It is an adaptation of a quarter-wave coaxial resonator. Depending upon the resonant line that's used, the channel can be resonated from about 6 meters up to 900 MHz. Electrically, the length of the wire line is equal to a quarter-wavelength at the operating frequency. Physically, the mechanical length is much shorter and is controlled by the lumped capacitance and the length of the channel. The actual tuning bandwidth for a single resonant line (channel) is limited to perhaps one or two bands such as 220-450 MHz.

F (MHz)	C (pF)	L (μH)
2	175	40
4	90	18
7	50	11
10	35	7
14	26	5.5
17	21	4.5
21	17	3.5
29	13	2.6
51	7	1.4
146	2.6	0.7
222	1.6	0.35
445	0.08	0.17

***Table 1.** Approximate values of capacitance and inductance shown for resonance of a tuned circuit for each of the ham bands indicated.*

Construction of the channel resonator is simple. A variable capacitor is mounted at one end of the box and with a wire, or coil, connected between the capacitor and the opposite end of the box. The box material has a metal interior with one broad side left open. Printed circuit board material is easily worked and can be soldered on the inside to form a metal box. The exterior may or may not have copper, as the circuit is dependent only upon the interior metal wall. Yes, an aluminum box will work as long as one side is left open for a wavemeter application.

Fig. 8 shows a simple technique for changing the band of frequencies covered by the device. Adding a movable wall on the far end of the wire line, the frequency of operation can be increased. For the frequency response to

remain stable, the wall and center wire must be soldered in-place because the circuit is dependent upon the circulating current path within the walls of the box and the wire.

Coupling to the channel resonator is done by holding the open side of the box close to the circuit being tested. Should the close proximity of the box to the circuit become cumbersome, an alternate coupling method may be employed.

Fig. 9 shows how a coax connector may be mounted in one wall of the box or at one end to provide coupling access. A wire loop is placed in close proximity to the resonator and is used for coupling a signal into the resonator. A loop (link) of wire may be used as shown in **Fig. 9a** when the connector is mounted in the wall.

Moving the loop closer or farther way from the center wire will control the amount of signal coupling.

As an alternative coupling method, a connector may be mounted on the side of the box as shown in **Fig. 9b** with a direct tap to the resonator wire. The amount of coupling is controlled by the placement of the tap onto the center wire. The link position should not be placed higher than about 1/4 the length of the wire up from the "cold" end. The matching impedance at the approximate 1/4 position is near 50 ohms and will be less as the tap position is moved toward the "cold" end.

Conclusion

Even though wavemeters have been around for a great many years and come in a wide variety of shapes and sizes, they are still a great standby piece of test equipment. A ham who experiments with circuits should always have a wavemeter available for that "one time" when it is most needed.

Please build up a wavemeter or two and experiment with them. In doing so, you'll develop an appreciation for what they can do for you. 73

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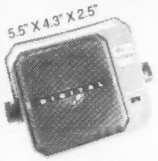

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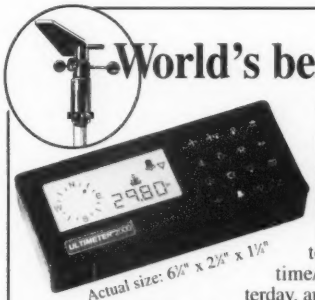

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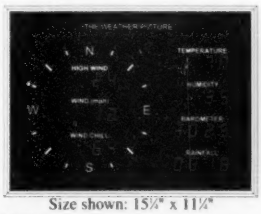

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Your Long-Lost Transistor Notebook

Part 2 of 4.

Part one of this series discussed some of the reasons why an experimenter should look beyond prepared circuit designs and look into how circuit values are established. Doing a little experimentation with transistors obtained from the "junk box" can provide a wealth of knowledge and an understanding of them.

Characteristic curves representing how a transistor responds electrically provides us with a desirable tool for determining how circuit values can be established for operating a transistor in a circuit. Since sets of characteristic curves on specific transistors are not generally available, the ham experimenter may choose to generate his own set of curves and build a data file for transistors found in his "junk box." Using that data file, the ham will be able to work out circuit values including resistor values, signal amplitude limits, linearity, input/output impedance, stage gain, etc.

Ib = _____	
Vce	**Ic**
0.5	
1.0	
5.0	
10	
15	
25	

Table 1. *Suggested table used for collecting test data. A separate table is required for each base current value to be examined.*

Part one left off with the suggestion for gathering together all of the transistors in your "junk box" and setting up a test for collecting data on how they react to a test stimulus. With the data collected in a table format, it can then be transferred to graph paper, where curves are plotted; these curves are called Vce-Ic characteristic curves.

Plotting the curves

Graph paper with a linear layout format is preferred over other formats. The size of the graph division is not critical and a common quadrille pad works well for this application. The first step in the process is to lay out and mark off the vertical and horizontal axes in the desired steps. It is recommended that the step increment between numbers be equal to create a linear axis.

A pencil is used to place marks on the graph paper that correspond to the data points obtained from the table shown in **Table 1** (carried over from Part 1). Plotting two or more points around the knee establish the general shape of the knee and the beginning of the slope toward the higher Vce values. Plotting one or two points between the top of the knee and the highest Vce value will establish the slope for the curve and, for most, it will be a straight line as shown by the example in **Fig. 1**.

I suggest plotting from five to ten base current curves in order to obtain a complete and more accurate profile of a transistor's response.

Characteristic curves

Once the curves are plotted, it is then necessary to use the set of curves as a tool. The plotted curves represent

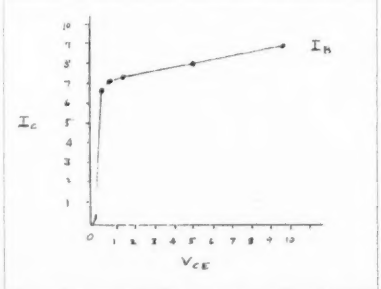

Fig. 1. *Example of how several points are plotted to establish a base current curve. A minimum of three points are plotted to define the knee of the curve and two or more points to define the straight portion of the curve.*

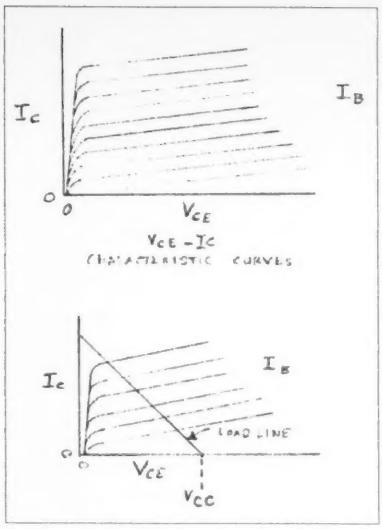

Fig. 2. *Load line laid out on a set of characteristic curves. Coordinates for the load line are at the maximum Ic value and the applied Vcc voltage value.*

the transistor's reactive response to how it will perform in a circuit, and as a result the curves are called characteristic curves.

To use the curves, it is necessary to set up a set of desired conditions under which the transistor is expected to function. The conditions first include the power supply voltage (Vcc) that will be used to power the circuit. The second is the maximum amount of current that you would like the transistor to handle; though it may never reach that specific value under normal operating conditions.

The steps involve locating the Vcc value along the Vce axis and then locating the desired maximum Ic on the vertical axis. With those two points marked with a pencil, use a straight edge and draw a line between those two points as shown in **Fig. 2**.

The straight line just drawn is called a "load line" and represents the path along which the transistor will travel while being used in the circuit. Consider the transistor as being on a short leash and being tied to a long clothesline such that it can move freely along the line from end to end. But with the leash, it can move only along the line and not away from the line. In other words, the load line establishes the operating path over which the transistor can function, and it will function only as its characteristics will allow. For Class-A audio applications, the transistor would typically operate at about the mid-point along the load line. In most cases, a linear transistor response occurs near the center portion of the load line.

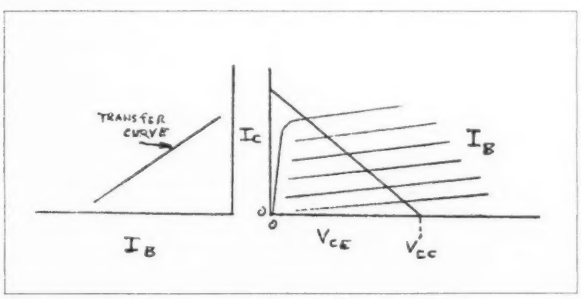

Fig. 3. *A dynamic transfer characteristic curve is shown on the left. The transfer curve shows the linearity of the amplifier's response to an input signal where a straight line is preferred. Any curvature in the transfer curve indicates amplitude distortion.*

Transfer curve

But to determine how the transistor is going to respond and to verify a linear response, another curve must be drawn which is called a "dynamic transfer characteristic curve" (see **Fig. 3**).

Although a transfer curve appears to

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be a duplicate of the load line, it isn't the same in that it follows the actual response of the transistor based upon the characteristic curves. That means it can be curved indicating a non-linear response, or straight indicating a linear response.

Let me tell you a short story about why hi-fi amplifiers became known for having "high power" when only a very low power is actually required for listening pleasure — that's my opinion! Anyway, linearity was the key issue involved, as can be seen in **Fig. 4,** where two "curved" examples are shown. Let's take, as an example, an amplifier capable of producing one watt of audio output. If we desire to obtain a full one watt of linear audio response, the transfer curve would have to be absolutely straight over its entire length. There is no guarantee that the transfer curve is going to be straight over its full length, so the resulting audio from our example would most likely exhibit distortion at the highest audio levels. If you examine the transfer curves shown in. **Fig. 4,** you will note that a very short section at any point along the curve appears to be straight.

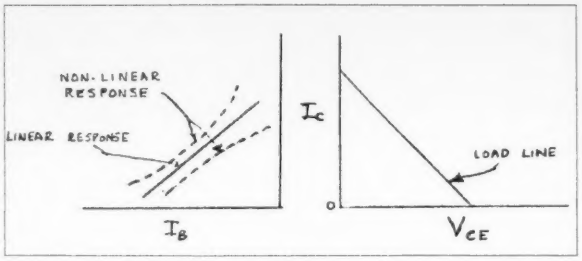

Fig. 4. Examples shown on the left of linear and non-linear transfer curves.

Therefore, the solution for achieving a "linear response" from an amplifier has been to raise the available power to, say 100 W, and then operate the amplifier at the one watt level, where the transfer curve shows the response to be essentially linear. In most circuit applications, seldom do we have the luxury of increasing the power for the purpose of improving response linearity. As a result, we need to examine the transfer curve for each device application and make some choices in the resulting design to achieve a desired response.

Following the example that's shown in **Fig. 5**, you can develop a dynamic transfer curve. A section of graph paper is placed to the left of the Vce-Ic characteristic curves where a load line has been drawn. Coordinates for the transfer curve use the same Ic and Ib increments that were used for plotting the characteristic curves, with the horizontal axis of the transfer curve being the Ib axis. It is important to have equal spacing between the Ib increments to ensure a linear scale factor.

A pencil dot is placed along the load line that corresponds to the intersection between the load line and the base current curve. As shown in **Fig. 5**, a dot on the load line is then transferred to the left until it corresponds to the same base current value as that on the load line.

With all of the transferred dots in place, hold the graph such that you can sight along the dots to view any possible curvature. Then, connect the dots with a pencil line and then sight along it again. I recommend drawing the line freehand rather than with a straight edge, because the use of a straight edge could mask a line curvature.

Let's stop here for a moment and summarize where we are on this tour. We've run tests on a transistor and have plotted a set of characteristic curves from the test data collected. Using the curves, we chose a Vcc and maximum Ic to establish load line coordinates. Using the load line, we then plotted a dynamic transfer characteristic curve and checked it for linearity.

Now, what does all of this mean to us? First, we've developed a set of tools that will allow us to examine the transistor in advance of a hardware project and will now be able to predict several things about the performance. The dynamic transfer characteristic curve is perhaps the most important tool, because from it we can now begin to develop circuit values. In Part 3 of this series, we'll set up a typical circuit application. Using the transfer curve, we'll work out the resistor values that support a Class-A linear amplifier response. In addition, the curve sets will provide us the tool for finding input/output impedance, circuit gain, amplifier response linearity, etc. In other words, all of the circuit parameters that you've been wondering about will now be able to be found. 73

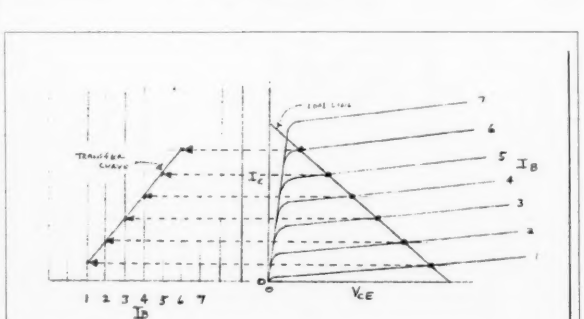

Fig. 5. Plotting the transfer curve. Load like intersection points are extended to the left and plotted against a liner Ib scale.

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The Telex 1990 — aka AS-2259 man-pack antenna — can be a treat for amateurs.

Hams are always looking for two very important things to operate portable HF. One is a usable, transportable power source; the other is a very easy-to-install antenna that covers all the HF bands. Here's the story of my search for the second.

Some operating locations do not have tall trees or other structures from which to hang a dipole or longwire. In keeping with the KISS principle, if you have a need it was probably done before, so look at what other people have done about this. Looking at some catalogs from Telex/Hy-Gain and Fair Radio Sales, I noticed the answer to my desires. Our Armed Forces are great users of radios, whether HF, VHF, or UHF. They have antennas for every situation, and then some. One antenna stands out: the AS-2259 man-pack antenna. It is easy to use and set up, fairly portable, handles up to 1kW, and is affordable via the surplus marketplace. This antenna is manufactured by Telex, and has the model number of 1990. (See **Photo A**.)

Operation and use

The Telex/Hy-Gain product literature calls it the "Near Vertical Incidence Skywave Antenna." In amateur terms, this is a high angle antenna, perfect for local communications within a 400 mile radius. The antenna has a 15-foot mast section which serves as the antenna coaxial line. The antenna has 4 wires: 2 on ground, and 2 on the center conductor. The wires are terminated to plastic insulators going to rope supports, and then ground pegs to secure the antenna structure.

The antenna was made to be set up by 2 people in less than 5 minutes. One person will have no trouble setting up this antenna in a few minutes. He unrolls the wire antenna, spreads the 4 wires equally, and then secures his pegs into the ground. Now he can assemble the mast section, by inserting each coaxial pipe into the bottom of the next. When the mast is complete, he rechecks each wire and the supporting rope. Then he eliminates slack, by tightening the length of the supporting rope or moving the ground peg.

This antenna was designed to be used with the PRC-47 man-pack transceiver that covers 2 to 12 MHz. The antenna mast was mounted right on the radio, with an adapter.

However, we nonmilitary personnel

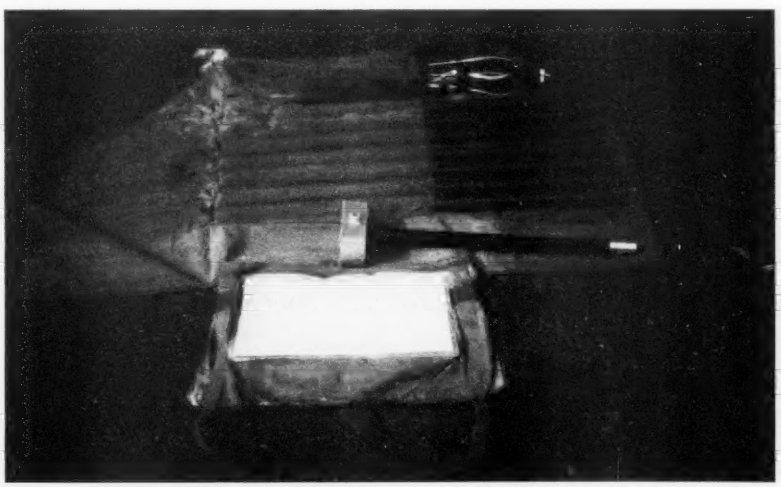


Photo A. *Easy setup portable HF antenna.*

Photo B. *I placed an SO-239 female connector on the box, with inside wiring going to the ground and center conductor.*

have just one problem with this antenna: The coaxial pipes that make up the mast sections have no easy way of attaching to our coax cable. The military and Telex/Hy-Gain have two types of mounting ground bases (the model 1994, and the model 1995, which has it own 4:1 transformer and only handles 50 watts). These mounting bases are hard to find on the surplus market, and very expensive if bought directly from Telex/Hy-Gain.

Please don't get me wrong: Telex military products are excellent and well designed, and will last a lifetime.

It's just that we amateurs don't have the same deep pockets as our government, whose vaults are lined with our hard-earned tax dollars.

You may wish to do the coax mounting with two alligator clips, ground to ground, center conductor to center conductor. Just be careful not to short the two together, or have the center conductor touch the ground.

Another mounting scheme I tried was to make another coaxial pipe section with a copper tube center, insulating the center tubing and then mounting a circular flange near the bottom end. I then used a metal box that supported the flange and coaxial antenna. I placed an SO-239 female connector on the box, with inside wiring going to the ground and center conductor (**Photo B**).

Other persons might want to make the metal box a little bit bigger to mount a tuning network. Most hams who use this antenna have mounted the bottom section to a 2" x 4" piece of wood, soldering the coax directly to the center pin, and using a metal self tapping screw with a lug for the ground connection.

The antenna is designed to have vertical and horizontal polarization. Its radiation pattern is omnidirectional. Many operators have found that this antenna is useful when contacting stations within 400 miles.

The antenna is packaged in a canvas roll bag that neatly carries everything. It weighs about 16 pounds, and is a compact 6" x 6" x 26" when packaged and rolled up. (Please refer to **Photo C**.) Using an antenna tuner, this antenna tunes from 3.5 to 30 MHz very easily. Most people who use NVIS antennas use them below 15 MHz, where the strength of their signal is higher. There were no bands that had a high SWR.

With today's automatic antenna tuners, this antenna will not present any problems. As an added bonus, the mast section can be also used to support a small VHF/UHF ground plane antenna. It's best to use a nonconductive material, to support the antenna onto the side of the mast.

The antenna was used in past Field Days, special events, etc. It is ideal for Field Day, where most of the low angle antennas are great for DX, but the NVIS is ideal for all the local stations within a 400 mile radius. Who else has something that is easy to put up, store, and transport, is easy to use, and has a low cost on the surplus market.

Internet sources

A very interesting Web site that has a NVIS section is: [http://www.tactical-link.com].

For those with Internet access, here are a few sites and news groups where you could look for military equipment. This is in no way a complete list. Many sell equipment of military nature in the "rec.amateur.boatanchors" newsgroup. Sometimes we see a military antenna of some sort in "rec.amateur.antennas." There are some Web pages that have military radios, and a dedicated mail reflector just for military equipment. Using your Web browser, check out [www.qth.net], and subscribe under the "milsurplus" group. 73

Photo C. *The antenna weighs about 16 pounds, and is a compact 6" x 6" x 26" when packaged and rolled up.*

Alf Coupe VK3CQE
5 Finch St.
Beechworth, Victoria 3747
Australia

John Wilson VK3LM
RMB 4201A
Tallangatta Valley, Victoria 3700
Australia
[johnvklm@mpx.com.au]

Farrell Winder W8ZCF
6686 Hitching Post Lane
Cincinnati OH 45239
[fwinder@one.net]

"Back later today, dear. I'll be at tomorrow's hamfest in Australia ..."

Here's a special report about the Twin Cities Radio and Electronics Club, Inc.'s Year 2000 hamfest held in the city of Albury, NSW, Australia.

Through the ingenuity of Alf VK3CQE and John VK3LM, everything was arranged so that W8ZCF in Cincinnati, OH, USA, could view many "live" scenes with pictures and sound from the Twin Cities Hamfest in Albury, NSW, Australia, which occurred on August 13th, 2000. Voice and pictures were made possible by utilizing VocalTec IPhone 4.5, an Internet voice-video software program. We believe a first may have been accomplished in this regard in connection with amateur radio hamfests.

Background

W8ZCF made acquaintances with Alf VK3CQE and John VK3LM through a mutual friend, Don Miller W9NTP of Waldron, Indiana. W9NTP and his wife Sue W9YL (now a silent key), had toured Australia by motor van, operating mobile under the call VK2IKZ/M. They had circled much of the coastal area of Australia during an 8-week tour beginning in September 1997. During this period, due to band conditions, Don could seldom be heard direct in Ohio, USA.

VK3LM acted as a relay via 20 meters to send Don's 80m and 20m SSTV pictures to W8ZCF. During this time, contact was also made with Alf, and SSTV exchanges have continued between these stations over the last 2 years. Many excellent, often "studio-quality," pictures of the people and landscapes of the two continents have been exchanged on 20m SSTV.

A few months ago, Alf and Farrell began to experiment with PalTalk, a voice/video computer Internet software system. They were able to attain only a partial success, with one-way excellent audio from Australia, but the return from the USA had to be via the keyboard. Alf, being the experimenter and "wizard" for which he is nicknamed, suggested a try be made with VocalTec, another voice video system. Assisted by 20 meter contacts to set up and make adjustments between the two stations, VocalTec IPhone 4.5 has been, most of the time, very successful. Exchange of "live" moving pictures on a once-a-week schedule has been maintained over several weeks. Pictures sent by both stations are 320 x 240 resolution, which produces about a 9 x12 cm picture on a 17-inch monitor set for 800 x 600 pixels. In the program there is also a provision for sending very high resolution still pictures through a "whiteboard." These pictures transmit very quickly, in a matter of seconds to

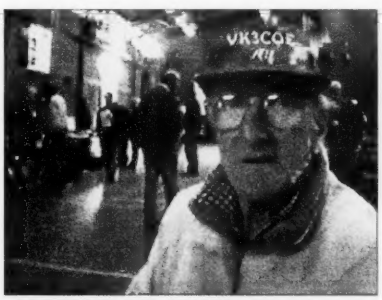


***Photo A.** Alf Coupe VK3CQE, first picture received by W8ZCF of Albury Hamfest.*

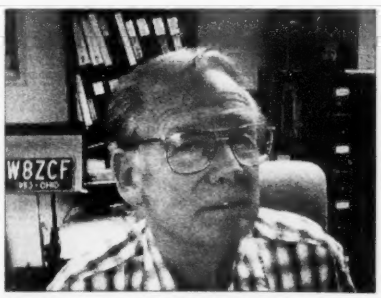


***Photo B.** Farrell Winder W8ZCF, typical of picture received at Albury Hamfest from Cincinnati, Ohio.*

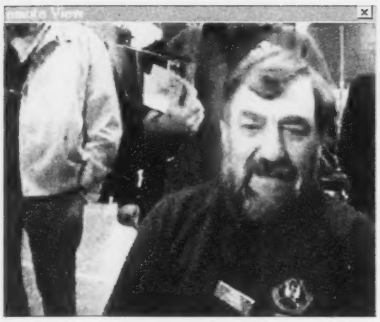


Photo C. *Greg Sargent VK2EXA.*

Photo D. *Bruce Mitchell VK2AYM.*

Photo E. *Brian Dick VK2TGS.*

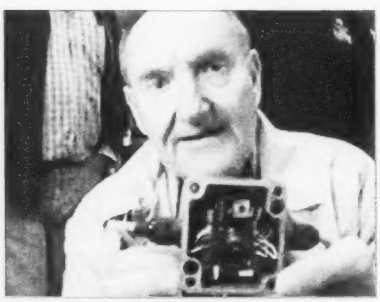


Photo F. *John Wilson VK3LM.*

a minute depending on the actual resolution, and provide very excellent quality.

Invited to the Albury Hamfest

With the above success, Alf related that he and John VK3LM were going to do an SSTV demo at the Albury Hamfest on August 13, 2000, and that W8ZCF was invited to attend using the VocalTec experimental system.

Alf set a time, explaining that he would first shoot a series of Olympic Torch pictures from that morning as the runners proceeded down Ford Street in his village of Beechworth, Victoria. He would then race to Albury via automobile to set up for the schedule.

Success!

Alf completed his Olympic mission. Precisely on schedule at 01:00 UTC, 9:00 p.m. USA and 11:00 a.m. Australia time on August 13th, 2000, VK3CQE appeared live on W8ZCF's computer screen!! So with all the available high tech arrangements, it was possible to watch an August 13th show on August 12th!

Alf presented a series of shots at the hamfest using a small low resolution camera connected to his Packard Bell computer. The picture of Alf in **Photo A** is the first picture received in Ohio. Typical of pictures seen in Australia from Farrell is that one shown in **Photo B**. W8ZCF was using a Debco Computer with an inexpensive Intel PC Camera (ProPack Version).

The connection to Australia continued for almost two hours of picture and voice exchange with many attendees at the show who came by for a look at the experiment. The connection to the Internet was provided by Ross Wheeler VK2DGY, who owns and runs the Albury local Internet service provider. Ross gave free use of the Internet, and the arrangements for the hamfest experiment were made between himself and Greg Sargent VK2EXA of Albury. All of us involved wish to thank them very much for their generosity. Greg attended the show, and his picture as received in Cincinnati is shown in **Photo C**.

Many other visitors came by, QSO'd through Alf's setup, and made their TV debut! These included Bruce Mitchell VK2AYM from Lavington, NSW, shown in **Photo D**. It may be noted that Bruce has a "Boarding Kennels" operation as seen from the logo on his shirt. Brian Dick VK2TGS of Thurgonna, NSW, is shown in **Photo E**.

John Wilson VK3LM of Tallangatta Valley, Victoria, is shown in **Photo F**

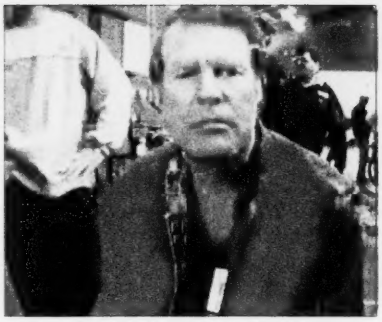


Photo G. *In Glanville VK3AQU.*

Photo H. *John Quarel VK3HJQ.*

Photo I. *Hayden, future ham.*

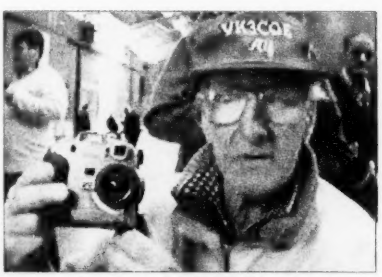


Photo J. *Alf Coupe VK3CQE, with Kodak DC 290.*

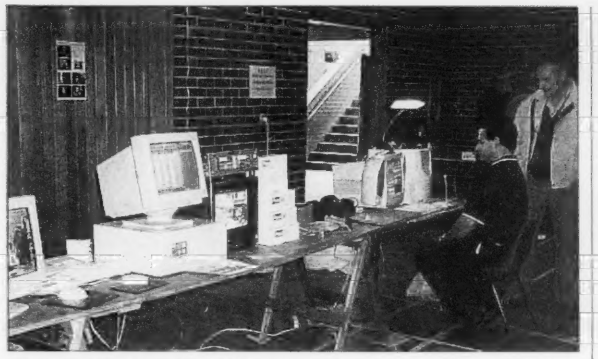


Photo K. *John Quarel VK3HJQ at computer, and John Wilson VK3LM.*

Photo L. *The computer/VocalTec IPhone setup.*

holding an SSTV Interface Box. This is a VK3LM design and was offered as a kit introduced at the show. The interface does not use a computer soundboard. (Details of this kit may be obtained by contacting John Wilson at [johnvklm@mpx.com.au].) To note how fast technical news can travel, combined with amateur radio, this picture was shown locally on 2m SSTV the next morning in a portion of the Ohio/Indiana/Kentucky, USA, area. There was immediate interest by two chaps. It was later in the day transmitted via 20 meters to Don W9NTP/7, who was mobile near Winslow AZ. Don also expressed much interest in VK3LM's development.

VK3AQU, In Glenville of Myrtleford, Victoria, is shown in **Photo G**. **Photo H** is of John Quarel VK3HJQ from Tallangatta, Victoria. Note the small toddler in this picture who has come for an early introduction to hamfest activities. **Photo I** is of "Hayden," perhaps a future ham operator. He seemed to prefer a close-up shot, perhaps trying to get as close to the USA as possible!

Photo J is of Alf with his Kodak DC 290 digital camera, preparing to take **Photos K** and **L.** After the pictures were taken they were sent via the "whiteboard" as explained in the above text. This photo shows John's and Alf's booth, with VK3HJQ posing for a picture. (See the copy of the actual "live" picture which was received as **Photo H.**) VK3HJQ is again shown in **Photo L**, along with the VocalTec IPhone setup. The small "ball"-shaped camera on top of the computer monitor produced Photos A through J, which were received in Cincinnati, OH. Alf's Packard Bell computer and the microphone used to converse with W8ZCF are shown to the right of the monitor.

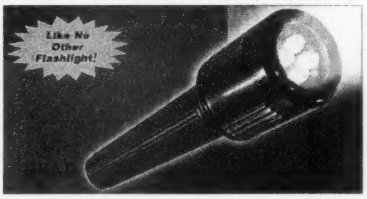
For "amateur" performance, we believe this experiment in showing live pictures from one side of the earth to the other must be a "first" for amateur radio hamfests. It was very successful, leading to much fun and excitement for all the participants and observers. In fact, W8ZCF definitely had the feeling of actually being there!

In return for the Albury experiment, it might be possible to set up another experiment to transmit one of the "live" forums of the Dayton 2001 Hamvention to an Australian group, subject to an agreement with all concerned.

Those who might be interested in also experimenting with the VocalTec program may download it from ZL3TMB's Web site at: [http://www.qsl.net/zl3tmb]. It is currently a free program, but good for only 7 days. It may easily be refreshed by the procedure of downloading to a saved file, uninstalling at the expiration date, and then reinstalling from the file, making it good for another 7 days.

Also supplementing amateur radio activities in a very broadening aspect of the hobby is the inclusion of VocalTec installations into many repeater stations around the world. For example, such repeaters as ZL3TMB-R, Christchurch, New Zealand; G7WFM-R, Nottingham, England; K5WH-R Houston, Texas, USA; and many others are currently set up to operate on a very frequent basis. Experience with these repeaters has resulted in excellent, enjoyable "DX" contacts that, in communicating performance, is comparable to operating though local repeaters with local contacts. The concept of combining with programs such as VocalTec should serve to strengthen amateur radio activities and contacts around the world. 73

LED FLASHLIGHTS (and more!)



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Read All About It!

Part 9 of good stuff from The Hertzian Herald.

All about More Troubleshooting Tips; Unit Men, Part 1; and Unit Men, Part 2.

Here are ten more troubleshooting tips to add to the ones we have given you before. As before, send me your favorite tips, and we'll do another ten in a few more months.

1. When troubleshooting a printed circuit board, shine a light on the bottom and view the circuit from the top. This will let you see the circuit tracks and allow access to lead wires for your test clips.

2. Metal transistor cases and heatsink tabs are nearly always connected to the collector, and provide easy-to-probe spots for checking voltages.

3. If a confusing or noisy trace appears on the oscilloscope, switch the trigger source to AC LINE. If the trace stabilizes, the noise is AC-line related.

4. Solderless breadboards are often ruined by forcing thick leads from 1-watt resistors or big capacitors into them. Later, when an IC pin is inserted into the same hole, the contact is sprung and makes intermittent contact. Solder an inch of #22 wire to the ends of those fat leads to avoid damaging your $35 proto-board.

5. Flexing often causes 'scope probes and coaxial test leads to open-circuit at one end — but which end? Touch the center pin of the connector to an oscilloscope's vertical input or a DVM on AC-Volts. The intact end will pick up quite a bit of AC line noise; the broken end, almost none.

6. A wooden toothpick is useful for keeping PC-board holes clear of solder while heating them.

7. You say you need to measure a 30 meg resistor, but your DVM only goes up to 20 megs? First, measure a nominal 18 meg resistor (call it Ra), then place it in parallel with the unknown (Rx). The unknown can be calculated from the Product-Over-the-Difference formula: Rx = Ra x Rtot / (Ra – Rtot). For example, if Ra = 18.13 megs and Rtot = 11.47 megs, then Rx = 31.22 megs.

8. You can often determine power supply current without breaking any wires by measuring the peak-to-peak ripple voltage across a filter capacitor on a 'scope. Where t is the discharge time between charging pulses, calculate I = C x Vp-p / t. For example, if a 40-µF cap has 2 V p-p ripple and discharge time is 8 ms, I = 10 mA.

9. Is the zener conducting? Zener diodes above 8 V produce a white noise of 5 to 20 mV p-p when conducting. If a sensitive 'scope on AC coupling doesn't show the noise, it's a good bet the zener isn't conducting.

10. Of course you can check a silicon diode by looking for high resistance one way and low resistance the other way on an ohmmeter. But high-voltage diodes (above 1 kV) usually consist of several silicon diodes in series internally, so the forward voltage required to get the "low" reading will likely be higher than the ohmmeter's test voltage, and you'll get a high reading both ways. Use a 9 V battery in series with the meter on the DCV range to check HV diodes.

Reprinted with permission from *The Hertzian Herald*, newsletter of the Monroe County (MI) Radio Communications Association (MCRCA).

Unit Men, Part 1

In pre-industrial times there was little need for an exact system of measure. Barter was the rule: this pig for that stack of hay; my two dozen eggs for the use of your plow horse for an afternoon. Surprisingly, electrical measures were just this informal prior

to about 1890: 100 Daniell cells in series for a 150-mile telegraph circuit using No. 11 iron wire was a common rule — no mention of volts or ohms.

Charles-Augustin de Coulomb (French) began the trend toward more exact electrical measurement in 1785, when he proved that the force between two electrostatically charged bodies varied inversely as the square of the distance between them: $F = Q1 \times Q2 / d^2$. The unit of charge (Q) was designated the coulomb (C) in his honor. A coulomb is the charge of 6.24 billion billion electrons. We don't often run into coulombs in everyday work because we don't have any coulomb meters to measure them, but the concept of charge underlies everything we do in electronics.

Alessandro Volta, in Italy, invented the electric battery in 1800 by stacking a large number of alternating copper and zinc plates separated by saline-soaked cardboard. Prior to his invention there was no such thing as an electric circuit or a continuous electric current. The importance of his invention, and of the concept of electromotive force, can hardly be overstated; yet the unit of the volt for EMF was not widely used until after an 1891 standards conference sponsored by the American Institute of Electrical Engineers.

Hans Christian Oersted (Danish) established the link between electricity and magnetism in 1820 when he noticed that a compass needle was affected by a current-carrying wire. The unit of magnetic field strength (an obscure thing) is named for him. André-Marie Ampère (French) read of Oersted's discovery; within a year, he had invented the electromagnetic coil and developed a mathematical theory quantifying how electric currents produce magnetic forces. The unit of current, which equals a flow rate of one coulomb per second, is named for Ampère.

In 1827, Georg Simon Ohm (German) developed the famous law which bears his name. Legend has it that, lacking an ammeter, he used his bodily shock sensation to judge the increasing currents due to increasing voltage: "60 cells — that tickles; 90 cells — ouch; 120 cells — yikes!" Henry Cavendish, an Englishman, had proposed the I = E / R relationship years earlier in private writings which remained unknown until the late 1800s, when James Clerk Maxwell edited and published his papers. As with Leif Eriksson and Columbus, it was not the one who made the first discovery, but the one who first revealed it to the world who was honored. The unit of resistance might have been the Cavendish, but it is the Ohm.

James Watt was a Scottish engineer who improved the design of the steam engine in 1769 by using a separate condenser chamber to cool the steam back to water. Thomas Newcomen had invented a rather clumsy steam engine in 1712, and modern high-pressure steam engines were developed by Richard Trevithick around 1800, but Watt was chosen over them to have the unit of electrical power named after him. At first this may seem strange, because Watt's work was not in the electrical area. But in the metric system the unit of power — mechanical or electrical — is the watt. The equivalency in English units is 746 watts = 1 horsepower.

Unit Men, Part 2

The capacitor originated in Leyden, The Netherlands, in 1746, and was called the Leyden jar. In form it was a glass jar, partly filled with a conductive liquid, and wrapped with a metal foil on the outside. Static charges were stored in the jar, giving rise to the notion that electricity was a form of fluid. Capacitors in their modern form were developed by battery inventor Alessandro Volta in the 1820s.

Strange then, that the unit of capacitance, the farad, was named for Englishman Michael Faraday, whose work was not mainly in capacitance, but in electromagnetism and induction. Faraday discovered that a force existed on a current-carrying wire in a magnetic field — the basis of the electric motor — in 1821. In 1831 he discovered that a constant magnetic field would not induce a current in a coil, but a changing field would — the basis of the transformer.

Faraday kept detailed notebooks covering decades of meticulous experiments in electricity. He did not have the mathematical talent of other researchers, and wrote touching letters begging them to put their results in everyday language so he could incorporate their insights into his experiments.

Joseph Henry (American) had discovered the transformer principle a year earlier than Faraday, but Faraday was the first to publish, so the credit is given to him. Henry developed an electromagnet capable of lifting 750 pounds

Continued on page 61

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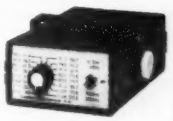

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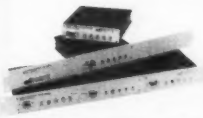

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CALENDAR EVENTS

Listings are free of charge as space permits. Please send us your Calendar Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the November issue, we should receive it by August 31. Provide a clear, concise summary of the essential details about your Calendar Event.

AUG 4

LEWISTOWN, PA Juniata Valley ARC, and the Decatur Township Fire Co., will host a hamfest at the Decatur Township Fire Co. grounds on U.S. 522 North (8 miles east of Lewistown PA). The event begins at 8 a.m. Admission is a $2 donation. XYL and kids admitted free. Tailgating $5 donation. Food will be available. Talk-in on 146.91 MHz. For more info call *Richard Yingling* at *(717) 242-1882.*

AUG 5

BERRYVILLE, VA Shenandoah Valley ARC will host their hamfest at Clarke County (Ruritan) Fairgrounds in Berryville VA starting at 6 a.m. on August 5th. Take I-81 at (Winchester) Exit 315 to Rte. 7 East (9 miles), bear right onto business Rte. 7 just before the traffic light. Fairgrounds on the left; OR Intersection of Rte. 340 and Rte. 7 in Berryville, go west approx. 2 miles. Fairgrounds on the right. ARRL VE exams at 1 p.m. Ruritan barbecue chicken dinners. Talk-in on 146.82. Admission $5, tables $12–$20. Contact *Brian Mawhinney WB3FUM, 2432-69 Berryville Pike, Winchester VA; (540) 665-0761.* E-mail *[WB3FUM@arrl.net;* Web site *[http://www.Vvalley.com/svarc].*

AUGUST 11

HUNTINGTON, WV Amateur radio and computer hobbyists from all over the mid-west will be in Huntington WV on Saturday, August 11th, for a giant hamfest and computer show at the Veterans Memorial Field House, 2590 Fifth Ave., 8:30 a.m.–2 p.m. The event is being sponsored by the Tri-State ARA. Tables paid for by July 31st are $8 each; $12 at the door (if still available). Call *Ezra Taylor N8KTA, (304) 429-1667.* VE exams at the Field House; be there by 10:00 a.m. for registration. All examination elements, written and Morse Code, where applicable, will be offered for all classes of amateur radio licenses. A fee of $10 will be charged per test. Pre-registration is not necessary but applicants must present two forms of acceptable identification, including one picture ID. Bring the original of any ham license currently held, and any Certificate of Successful Completion of Examination (CSCE) to claim credit from a previous exam. *Garry Ritchie W8OI,* leader of the TARA VE team, may be contacted at *(304) 733-1300,* for further details.

LONGVIEW, WA The Lower Columbia ARA, W7DG, will sponsor its 10th Annual Ham Radio, Computer, & Electronic Equipment Swap Meet from 9 a.m.–1 p.m. at the Cowlitz Co. Expo Center in Longview. Admission $4, tables $10, tailgate spaces $5. Commercial dealers may contact the LCARA to register for free tables, and admission. NW radio clubs can also register for a free club table; attendants pay only for admission. Food concessions, free parking, overnight RV parking on the fairgrounds for $12; electrical hookup available. Sorry, no VE exams. Vendor set up on Friday from 5–9 p.m.; Saturday from 6:30–8:45 a.m. Talk-in on 147.26(+), PL 114.8. Take exit 36 or 39 off Interstate 5 and follow the signs west for the Expo Center (or fairgrounds). Mt. St. Helens and Oregon coast nearby. For more info, write to *LCARA Swap Meet, P.O. Box 906, Longview WA 98632;* or call *Bob KB7ADO at (360) 425-6076 in the evening.* E-mail *[kb7ado@aol.com].* Link to flyer online at *[www.qsl.net/nc7p/].*

AUGUST 12

GREENTOWN, IN The 4th Annual Greentown Hamfest will be sponsored by the Kokomo and Grant County ARCs, and the ARRL, Sunday, August 12th, at the Greentown Indiana Lions Club Fairgrounds. This event will be held 8 a.m.–1 p.m. Vendors must pre-register by sending a form *[www.grantarc.com/greentown.html],* or by E-mail to *[k9nqw@skyenet.net].* Talk-in on 146.91 and 146.79. Handicapped parking available. Anyone who obtains a Tech license at the VE testing session will be admitted free. Tickets in advance are $4 each, admission at the door is $5, 12 and under admitted free. Vendor set up is Saturday, 6 p.m.–8 p.m.; Sunday 6 a.m.–8 a.m. Inside tables $8 plus ticket; tailgate set up $3 plus ticket. Contact *Greentown Hamfest, c/o. L.B. Nickerson K9NQW, 517 N. Hendricks Ave., Marion IN 46952;* tel. *(765) 668-4814;* or E-mail *[k9nqw@skyenet.net].* The Web site is *[www.grantarc.com/greentown.html].*

ST. JOSEPH, MN The 54th St. Cloud ARC Hamfest invites all radio hams, and those interested, to the "Middle of the State Flea Market and Fun Time," 9 a.m.–2 p.m. Set up starts at 8 a.m. The event will be held at the Del-Win Ballroom on Hwy. 75 and 88th Ave., near St. Joseph MN. Talk-in on 147.015 MHz, gabbing on 146.940 MHz. VE exams at 1 p.m. For current info check the Web site at *[www.w0sv.org].*

PEOTONE, IL The Hamfesters Radio Club Hamfest, featuring amateur radio, computers, and electronics, will be held at Will County Fairgrounds in Peotone IL. Exhibits open at 8 a.m. in a fully air-conditioned building. Flea market open 6 a.m.–3 p.m. No additional charge for flea market space. Set up Saturday, August 11th, 1 p.m.–11 p.m. Advance tickets $5 w/double stub, $6 at the gate w/single stub. Children under 12 free. For advance tickets (SASE and check by July 25th), and info, contact *Robert Nelson WB9WFR, 1720 Vollmer Rd., Flossmoor IL 60422; tel. (708) 756-7984,* or E-mail *[WB9WFR@aol.com].* Talk-in on 146.52 simplex and 146.64(-107.2) STARS rptr.

SHREWSBURY, PA Blaze a hot trail to the Shrewsbury Firehouse to have fun at the Shrewsbury Ham and Computer Swap Fest. From Baltimore take Route I-83N. From York and Harrisburg take Route I-83S to Exit 1. Take Route 851 West 1/2 mile to the Shrewsbury Firehouse on the right. Talk-in on 146.700. Gates open at 07:00. Gate fee is $5 for everyone over 12 (tailgating not included). Outside tailgate spaces are $3 per space. Inside tables are $10 each. There will be a mid-morning Fun Auction. Equipment, parts, etc., will be accepted as donations to the Swap Fest sponsors, or will be auctioned for a 10% fee. Items not donated must be clearly marked with a name or call sign for record keeping. This Fest will provide a place for you to swap, trade, or sell your excess or unwanted equipment. Hopefully you will also find something you have been looking for. Hot and cold food services will be available on the grounds. VE exams will be held Saturday, August 11th at the Shrewsbury Borough building. Registration 9:30 a.m.; testing 10 a.m. Contact *Carol Kirschman (717) 235-0273;* or E-mail *[carol@ nfdc.net].* For more swap fest info, please contact *John Salony (717) 741-1780;* Table sales, *Bill Kirby W3PNQ@yahoo.com]; Cecil Mundorff* by fax, *(717) 927-9282,* or phone *(717) 927-6662.* The Web site is at *[www.carli-online.com/hamfest].* This event is sponsored by the Southern PA Group; Hilltop Transmitting Assn.; and York White Rose Amateur Radio Clubs.

AUG 18

OAKLAND, NJ The Ramapo Mountain ARC will hold its 25th Annual Ham Radio and Computer Flea Market on Saturday, August 18th, at the American Legion Hall, 65 Oak St., Oakland NJ 07436. Vendors admitted at 6 a.m., buyers 8 a.m.–noon. The kitchen opens at 7 a.m. Donations $4 (XYL and harmonics free). Inside tables $10. Tailgating $8. Talk-in on 147.49/146.49 and 146.52 simplex. For info please contact *Steve Oliphant N2KBD, 10 Glen Rd., Ringwood NJ 07456-2331;* tel. *(973) 962-4584,* fax (973) *962-6210.* Club E-mail *[rmarc@qsl.net],* Club Web site *[www.qsl.net/rmarc].*

AUG 18–19

HUNTSVILLE, AL The Huntsville Hamfest and Alabama ARRL Section Convention will be held Saturday and Sunday, August 18th and 19th, at the Von Braun Center, 700 Monroe St., Huntsville AL. Admission is $6, under 12 free. Doors open both days at 9 a.m. VE exams will be held both days at 10 a.m. Forums include ARRL, MARS, Skywarn, QRP and more. Convenient parking. Giant dealer/manufacturer show, huge flea market, E-Z drive-in vendor unloading, DX banquet and more. Friday and Saturday night hospitality rooms at the Huntsville Hilton. Talk-in on 146.94(-), call K4BFT. For special hamfest rates at the Huntsville Hilton, call *(256) 533-1400.* Other contacts: Dealer show, (256) 536-3904; flea market (256) 883-2760; Forums *(256) 539-8950;* DX banquet *(256) 721-5996.* For general info call *(256) 880-8004.* Visit the Web site at *[www.hamfest.org].*

AUG 19

LAFAYETTE, IN The Tippecanoe ARA will host their 31st Hamfest on Sunday August 19th, from 8 a.m.–2 p.m. at the Tippecanoe County Fairgrounds, 1401 Teal Rd. (SR 25). Admission is $4, children under 12 admitted free. Parking is free and there is no additional charge for vendors inside or outside. Talk-in on 147.135(+) and 443.775(+), use 88.5 Hz PL tone for both. VE exams will be conducted at noon at the Lafayette Red Cross Office. For more info check the Web site at *[www.w9reg.org],* or contact *David Dull WB9BRX* by E-mail, *[dave@dullville.com],* or tel. *(765) 743-8305.*

AUG 25

LAPORTE IN The LaPorte ARC will host the LPARC Summer Hamfest, Saturday, August 25th, at LaPorte County Fairgrounds, State Road 2 west of LaPorte, 7 a.m.–1 p.m. Admission $5, tables $10, outdoor tailgating $2. Talk-in on 146.52 and 146.61(-) PL 131.8. For more info contact *Neil Straub WZ9N, P.O. Box 30, LaPorte IN 46352; tel. (219) 324-7525.* E-mail *[nstraub@niia.net].* The Club Web site is at *[www.geocities.com/K9JSI].*

AUG 25, 26

ALBUQUERQUE, NM The New Mexico Hamvention, Inc., will sponsor the Duke City Hamfest, August 25th and 26th, at the Rio Rancho National Guard Armory, 4001 Northwest Loop. Take 1-25 to Bernalillo, west on US 550 (NM-44), approximately 8 miles to the Armory (watch for signs). Doors open Saturday at 8 a.m–5 p.m., Sunday 8 a.m.–1 p.m. Flea market, tailgates $5, VE exams, forums. Free admission. Talk-in on 145.33(-) and 444.00(+) (100 Hz). RV parking, no hookups. Tables $12 without power, $17 with power or along the walls. Contact *Marcus Lieberman KM5EH, 2300 Hurley Dr. NW, Albuquerque NM 87120;* tel. *(505) 836-1724,* fax *(505) 352-6154.* E-mail *[km5eh@arrl.net],* or check the Web site at *[www.qsl.net/dchf].*

SEP 7, 8

MENA, AR The Queen Wilhelmina Hamfest Association will present their 32nd annual Mena Hamfest on September 7th and 8th at the Queen Wilhelmina State Park near Mena AR. The location is 13 miles west of downtown Mena, on Hwy. 88. Talk-in is on 146.79, 100 Hz tone. For flea market spaces, contact *Charlotte Lee KC5DOR* at *[clee48@ipa.net],* or *415 Crosstrails Rd., De Queen AR 71832.* The Grand Prize will be a DX70.

SEP 8

BARTONSVILLE, PA The Eastern Pennsylvania ARA and The Pocono ARK will co-sponsor the Pocono Area Hamfest and Electronics Exposition, Saturday, September 8th, at the Monroe County Vo-Tech in Bartonsville. This event will feature new and

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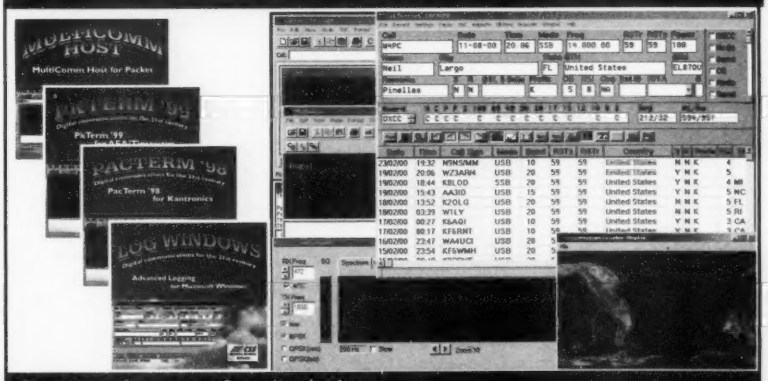

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previously owned equipment, electronics parts, radios, computers, and more. Admission $5, children and spouses free. Gates open at 8 a.m. for the general public. Vendors: $15 inside space 12 ft. x 6 ft. each; $5 outside space 10 ft. x 20 ft. each. Vendor gates open at 6 a.m., with set up *before* 6 a.m. Set up time must be pre-arranged. Talk-in on 147.045(+) PL 131.8, 146.865(-) PL 100, or 146.535 simplex. VE exams will be available. For further details contact *Bill Connelly W3MJ* at *(570) 424-2174;* or *Jerry Truax* N3SEI at *(570) 620-9080.* The theme of this event is "Public Service & Fun for the Whole Family." Various area public service agencies, the National Weather Service, Search and Rescue, Fire Dept., etc., will be on hand, as well as many vendors and exhibitors.

SEP 9

BALLSTON SPA, NY The Saratoga County R.A.C.E.S. Assn. Inc. will hold its 16th Annual Hamfest on Saturday, September 9th, at the Saratoga County Fairgrounds in Ballston Spa. This will be held rain or shine, all under cover. Gates open at 7 a.m., with the hamfest running until 3 p.m. Admission is $5, including 1 tailgate spot and free parking. There will be door prizes, a fox hunt, VE exams, and plenty of food. Talk-in on 146.40/147.00 and 147.84/.24. Reserved tables $5 each, first come, first served. Reservations and pre-pay welcome and encouraged. Early set up for all vendors. For further info and/or reservations, contact *Darlene Lake N2XQG, 314 Louden Rd., Box #84, Saratoga Springs NY 12866;* tel. *(518) 587-2385,* E-mail *[lake@capital.net].*

BETHPAGE, NY The LIMARC Fall 2001 Electronics Hamfair and Flea Market will be held Sunday, September 9th, at Briarcliffe College, 1055 Stewart Ave., Bethpage NY. Gates open at 7 a.m. for vendors, and at 8:30 a.m. for buyers. Outdoor tailgating only, rain or shine. Each space is $15 and includes admission for one person. Additional workers will be $6 each. No advanced registration needed. General admission is $6, children 12 and under accompanied by a paying parent, as well as non-ham sweethearts, are free. For more info visit the LIMARC Web site at *[http://www.limarc.org],* or call the 24-hour hotline at *(516) 520-9311.* Talk-in is on the 146.850 rptr., PL 136.5. E-mail *[hamfest@limarc.org].*

SOUTH DARTMOUTH, MA The Southeastern Massachusetts ARA, Inc., will hold its annual flea market on the club's grounds at 54 Donald St., South Dartmouth MA. The event will run from 9 a.m.–1 p.m. Talk-in on 147.00/.60. Admission $2, spouse and children free. Food, door prizes, walk-in VE exams (10 a.m.), and more. Free space for vendors! For further info contact *Tim Smith N1TI* at *(508) 758-3680;* or by E-mail at *[rt_smith@yahoo.com].*

SEP 14, 15, 16

PEORIA, IL The Peoria Area ARC will host the Peoria Superfest 2001 Amateur Radio, Computer and Electronics Show at Exposition Gardens, Peoria IL. The flea market will be held 3 p.m. until dark on Friday, September 14th. Live music will be presented Saturday night in the South Garden Pavilion. VE exams will take place Sunday, 10 a.m.–1 p.m. Gates open 3 p.m. Friday, 6 a.m. Saturday and Sunday. Commercial buildings will be open Saturday, 8 a.m.–4:30 p.m., and Sunday, 8 a.m.–3 p.m. Advance tickets are $5 with two stubs; $7 at the gate with one stub. All tickets good for the weekend. Outdoor flea market space can be reserved in advance for $5, plus $5 for each admission ticket. Space and admission tickets are good for the entire weekend. Set up for the outdoor flea market will be Friday at 10 a.m.; 6 a.m. Saturday and Sunday. Set up for indoor commercial vendors will be Friday, 2 p.m.-9 p.m.; Saturday, 6:30 a.m.; Sunday, 7:30 a.m. Talk-in on 147.075(+). Visit the Web site for the latest Superfest info *[www.w9uvi.org].* E-mail for tickets and space reservations to *[w9uvi@arrl.net].* The postal mail address is *Peoria Superfest, P.O. Box 3508, Peoria IL 61612-3508.*

SEP 22

NEW PORT RICHEY, FL The Suncoast ARC will hold the 11th Pasco County Hamfest 9 a.m.–3 p.m. on September 22nd, at the New Port Richey Rec. Center, 6630 Van Buren Rd., New Port Richey FL. Admission $5, XYLs and under 12 free. Tables $15 each, electric $5. Tailgate spaces $3 each. You must have admission to enter tailgate or exhibit hall. This event will be held inside with air conditioning. For more info, contact *Owen Godwin KI4CT, (813) 909-1336;* E-mail *[KI4CT@ARRL.NET].* Talk-in on 145.35 rptr.

SPECIAL EVENTS, ETC.

AUG 18–20

42nd ANNUAL NEW JERSEY QSO PARTY The Englewood ARA, Inc. invites all amateurs the world over to take part in their 42nd Annual New Jersey QSO Party. Rules: (1) The time of the contest is 2000 UTC Saturday, August 18th–0700 UTC Sunday, August 19th, and 1300 UTC Sunday, August 19th–0200 UTC Monday, August 20th. (2) Phone and CW are considered the same contest. A station may be contacted once on each band — phone and CW are considered separate bands. CW contacts may not be made in phone band segments. New Jersey stations may work other New Jersey stations. (3) General call is "CQ New Jersey" or "CQ NJ." New Jersey stations are requested to identify themselves by signing "De NJ" on CW and "New Jersey calling" on phone. Suggested frequencies are 1810, 3535, 3950, 7035, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50-50.5, and 144-146. Suggest phone activity on the even hours; 15/10 meters on the odd hours [1500–2100 UTC]; 160 meters at 0500 UTC. (4) Exchange consists of QSO number and QTH (state/province or country). New Jersey stations will send county for their QTH. (5) Scoring: Out-of-state stations multiply number of complete contacts with New Jersey stations times 3 points per QSO times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply number of complete contacts times 3 points per QSO times the multiplier. The multiplier is the sum of the number of states (other than NJ), Canadian provinces, and NJ counties worked. Maximum is 49 + 13 + 21 = 83. (6) Certificates will be awarded to the first place station in each New Jersey county, state, province, and country. In addition, a second place certificate will be awarded when four or more logs are received. A total of two plaques have been donated by the ARRL Section Managers for NNJ and SNJ to the highest scouring single operator station residing in each of their sections. (7) Logs must show the UTC date and time, QSO exchange, band, and emission, and be received no later than September 15th, 2001. The first contact for each claimed multiplier must be indicated and numbered, and a check list of contacts and multipliers should be included. Multi-operator stations should be noted and calls of participating operators listed. Logs and comments should be sent to *Englewood Amateur Radio Assn., Inc., P.O. Box 528, Englewood NJ 07631-0528 USA.* A #10 size SASE should be included for results. (8) Stations planning active participation in New Jersey are requested to advise EARA by August 1st of your intentions so that plans can be made for full coverage from all counties. Portable and mobile operation is encouraged. 73

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"Proudly Serving Those Who Serve"

When we talk about the importance of portable, mobile, and emergency communications we usually think about amateur radio's role. There are other communication services as well that are key players in these areas, however, some of which are closely associated with amateur radio. One of these is the Military Affiliate Radio Service or MARS. There is one MARS service associated with the Army and Air Force and another supporting the Navy and Marine Corps. As a member of the Navy-Marine Corps MARS program, (whose motto is our title this month) I'll focus on that, although most of the concepts are similar for Army-Air Force MARS.

There is a long tradition of association between amateur radio and the U.S. Navy that dates back to the earliest days of wireless communications. This cooperation helped the Navy to attract many amateur radio operators as service members during both world wars. Today Navy MARS provides the Department of the Navy and the Department of Defense with a source of emergency communications on a local, national, and international basis as an adjunct to normal naval communications. Day-to-day MARS operations are performed to train operators in the skills they might need to fill this role in an emergency or other contingency.

The most important role for the MARS operator is to provide communications in the unexpected situation. Just like in any other emergency service, we don't know what the next emergency will be so we have to prepare for a wide range of possible events. It could be a weather emergency or other disaster similar to what we prepare for as amateurs involved in the Amateur Radio Emergency Service (ARES) or the Radio Amateur Civil Emergency Service (RACES). On the other hand, with MARS the event could be unique to the needs of the military.

Even in this day of global communication by satellite and a cellular phone in every pocket or purse, MARS fills a very real need. When the military provided logistics and supply support for Operation Deepfreeze in Antarctica, telephone communications were augmented by Navy MARS. Telephone coverage was limited, so MARS provided phone patches so that personnel on "the ice" could call home. During Operation Desert Storm in the Arabian Gulf, banks of telephone booths were set up for the use of the troops. The lines to use these phones were monumental, and once again MARS was there to help out the troops. If you've ever been deployed to some far-off land, you'll understand how important this is to the average GI, and today's young men and women are used to being in frequent communication with friends and family.

How does an amateur become a member of MARS and what are the qualifications? If you have a Technician-class license or higher, you meet the first requirement. You must be a U.S. citizen or be a legal permanent resident seventeen years of age or older. You must have a station that can operate on a minimum of two MARS frequencies within the 2–30 MHz range that are used in your area. You must complete a correspondence course and you must be willing to operate for a minimum of 18 hours each quarter. That's all there is to it!

What are the benefits? First, you have access to frequencies that are specifically authorized for MARS use. These frequencies are assigned to different areas at specified times and can only be used as part of a network. Most modern transceivers can be readily modified to operate on these frequencies and MARS members have access to information on these modifications. From time to time, equipment may be made available to MARS operators that the government no longer needs for other purposes. During emergency situations, the MARS frequencies are legally more protected than amateur frequencies. This means that sensitive information can be transmitted without it being repeated on the local news. Members of the Navy Reserve can receive credit for their participation. Finally, it's yet another fun aspect to the amateur radio hobby!

If you enjoy (or are just curious) about traffic handling, this is a natural extension. Military communications procedures are carefully defined, particularly given the types of messages upon which the military depends. While MARS operators are not involved in tactical situations, the precision required does make for a more regimented approach even for more mundane traffic. Net control is more active than in many amateur nets, with a structure that permits prioritization of traffic and its efficient handling.

In the Navy MARS system, it is possible to move up to higher status in the organization in a manner similar to ranks for radio operators in the Navy. This provides a level of recognition for achieving higher levels of capability. There are also a number of important jobs that must be performed within each MARS region. There are individuals assigned specific areas of responsibilities as directors and coordinators. Some assignments are by geography while others are by area of responsibility, such as emergency communications or training.

Curious? A good starting point is one of the Web pages that are operated by MARS. For the Navy-Marine Corps, check out [http://navymars.org]. For the Army-Air Force, use [http://www.asc.army.mil/mars/]. There is a lot of good general information

Continued on page 62

Andy MacAllister W5ACM
14714 Knights Way Drive
Houston TX 77083-5640

Modes Explained

What's the difference between a typical Mode "B" satellite station and one that's ready to go for Mode "US" on AMSAT-OSCAR-40? The answer is simple and easy; an inexpensive surplus downconverter, a cheap dish, and some 75-ohm TV coax cable.

Mode "B" is defined as a satellite transponder using 70 cm as the uplink band and two meters for the downlink. The "B" comes from the first hamsat to incorporate multiple transponders, AMSAT-OSCAR-7. AO-7 was launched in 1974 and had different modes that were commanded from the ground. They were labeled according to digital circuit states A, B, C, and D. Mode "A" was the two-meter up and 10 meter down transponder. Mode "B" was the 70 cm up and two meter down transponder in the high-power (10 Watt) configuration. Mode "C" was the low-power (2.5 watt) version of Mode "B". Finally, Mode "D" was control for the 70-cm telemetry transmitter. It could be set to either on or off while the satellite was in Mode "D".

Over the last quarter century, we have retained the mode labels that began with AO-7, but have recognized that the system is antiquated and not logical. AO-40 is the first satellite to use labels that make a bit more sense. Mode "B", for instance, is now called Mode "UV", where the "U" stands for UHF (70 cm) and "V" is for VHF (two meters). The ground station transmit band is first with the receive band noted second.

During World War II, letter labels were applied to the microwave bands associated with RADAR systems developed by the Allies. The letters were used in an attempt at secrecy. We still use these labels, and others that were attached to various frequency ranges after the war. On AO-40, "US" means UHF up and SHF (13 cm) down. Another common mode is "LS" for 23 cm up and 13 cm down.

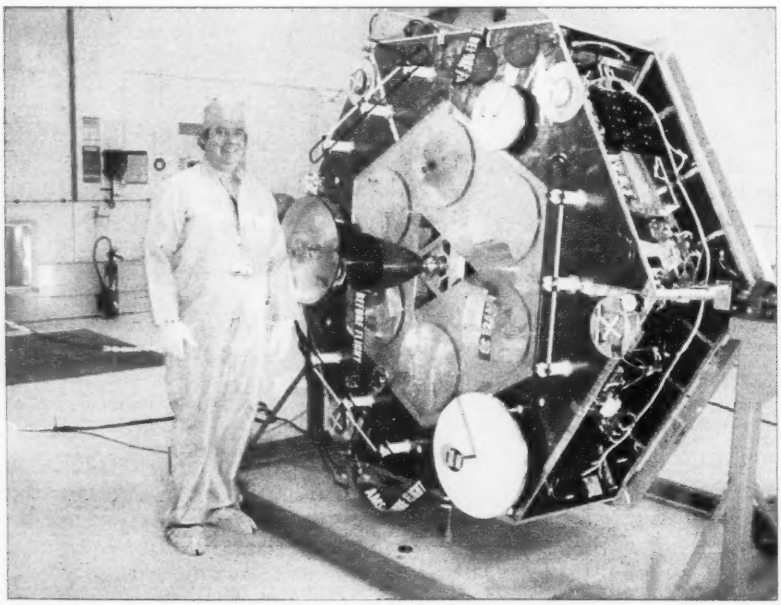

***Photo A.** Peter DB2OS and AO-40 a few days before launch from Kourou. Most of the antennas are on the same side of the satellite as the main motor. (AMSAT-DL photo)*

The great day

On May 5th, Stacey Mills W4SM activated "US" and "LS" operation on AO-40 at 0800 UTC. This was not a closed test operation. This was the first day of open communications operation for anyone who had the interest and gear to make some contacts. There are two Mode "S" systems on AO-40. The one that was activated (S2) can run 50 watts to a helix located on the motor side of the satellite. There is an additional higher-gain dish antenna on the other S1 system, but it was not used due to its narrower beam pattern since the satellite was not oriented for optimum gain at the center of the viewable earth. It was however, good enough for many stations to make contacts, mostly using simple receive systems.

Although a few hams had expensive antennas and downconverters ready for the first day of operation, the majority were using modified MDS (Multipoint Distribution Service TV) converters and "BBQ-grill" dishes to receive the signals around the S2 telemetry beacon on 2401.350 MHz. Any installation that can receive the S-band signal from UoSAT-OSCAR-11 on 2401.5 MHz can be used for successful AO-40 operation. The March, 2001, "Hamsats" column discusses various cheap downconverters, while the May, 2001, column shows pictures and provides details and some alternatives.

Most downconverters are powered through the 75-ohm TV coaxial cable that brings the lower-frequency, 2-meter signals back to the shack. Mode "S" converters are typically mounted at the antenna, since losses in almost any cable are prohibitive at these frequencies. The DC power is easily

sent through the cable using chokes to block RF and pass DC, and capacitors to block DC and pass RF. Most converters are powered on all the time. This keeps the internal oscillator somewhat stable, and heat from the internal voltage regulators keeps condensation from collecting inside the unit. If you are using a 2-meter transceiver for AO-40 reception, be sure that it cannot transmit while the down converter is connected. It's very easy to burn out a converter with only a few watts on 2 meters.

Getting on the air

The time to get your system ready for 2400 MHz reception is now. Check out the previous "Hamsats" columns noted above and the October 2000 Special Satellite Issue of *73*. Any system that has enough power on 70 cm to work the now-antique AMSAT-OSCAR-10 (about 50 watts to a yagi) will have plenty for AO-40. If you transmit too much power, don't be surprised if you hear from LEILA (LEIstungs Limit Anzeige), the "Power Limit Indicator." Any uplink signals that exceed recommended levels are first warned by a beeping sound through the downlink. If the problem persists, LEILA notches out the signal so that it cannot desense the satellite's receiver.

For those who can generate about 100 watts ERP (Effective Radiated Power) on the 23 cm uplink, Mode "LS" is a fun alternative to Mode "US." Mode "LS" is usually activated simultaneously to Mode "US." An Icom 1271A with 10 watts on 1.2 GHz through some very low-loss cable, to a 45-element, linearly polarized loop yagi, will be quite enough to do the job.

AO-40 is not always aimed directly at the earth. To know when the satellite is best for you, the orientation of the spacecraft can be input as data in some of the better tracking programs. The numbers to use are called ALON and ALAT. When these two numbers are both zero, the main motor and the Mode "U", "L", and "S" antennas are aimed at the center of the earth when at apogee, or the high point of the orbit. Unlike some previous satellites, the main motor is on the same side of the satellite as most of the antennas. Best signals will always be found when the satellite's antennas are aimed your way. InstantTrack from AMSAT [http://www.amsat.org] generates an off-pointing angle value when given accurate ALON and ALAT data. The higher the off-pointing, the poorer the signals, both up and down.

What's next?

In the days and weeks since that first day of open operation on AO-40, ground controllers have run tests on other receivers and transmitters. The digital communications system, RUDAK, is working well. When loaded with appropriate software, the satellite can be used for many types of digital operations without impact on the analog voice and CW activity. The first tests on the 10 GHz transmitters were not successful. Commands were sent to the satellite to activate both the solid-state unit and the TWT (traveling wave tube). There were no indications that anything had happened. There was no apparent RF output and no temperature changes inside the transmitters. Early tests on the 24 GHz transmitter were inconclusive. Although nothing was heard from the satellite during the first test, the satellite was not well aimed for the ground stations trying to receive the signals on 24048.150 MHz. More tests will be done later.

In late May and early June the satellite was reoriented to fire the ammonia arc-jet motor. While the main motor is out of commission due to the problems encountered in December, 2000, ground controllers in Germany are attempting to raise the perigee, or low point of the orbit. Without firing the arc, the energy available from the smaller motor is minimal, but should be enough to have some effect. It is hoped that the perigee can be raised a few hundred kilometers.

To stay tuned into the current status of AO-40, check out the AMSAT Web site noted above. If you are not currently subscribed to the various AMSAT remailers, and can stand a few hundred E-mails per week, consider subscribing to "amsat-bb" for current discussions and "ans" for official AMSAT news. Subscription instructions are available on the Web site. Another very useful source of updates is the German AMSAT-DL site [http://www.amsat-dl.org]. 73

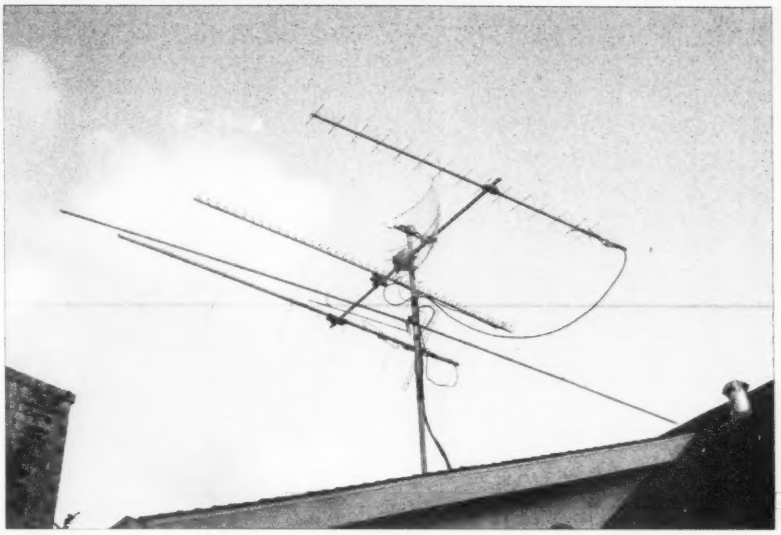

Photo B. *The 13-cm receive system, complete with Drake 2880 downconverter and "BBQ-grill" reflector, fits easily in this ground-station array which includes antennas for two meters, 70 cm, 23 cm, and even a dipole for 15 meters.*

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Neat Stuff Wish List

It's hard to believe, but summer is just about gone. It's time for campouts, picnics, and QRP! Today, you can carry equipment in your backpack that just a few years ago was someone's imagination. What a great time to be a ham radio operator!

If you're into camping and backpacking and like to bring along your QRP radio, here's a wish list of really neat stuff to have. These are just my opinions, and like they say, opinions are like armpits. Everyone has two and they usually stink. So, here's my pick. The first choices are the multiband radios. Then the monoband radios.

My top pick for portable QRP: The Yaesu FT-817

With the introduction of the Yaesu FT-817 this year, this is one radio that will soon find its place in a lot of campsites. This would be my choice today. It does just about everything you can imagine a radio should do. If you don't want to work the world, then how about sitting back on a log while listening to the BBC?!

And there's more! Besides CW, the FT-817 does a nice job on SSB. And you never know when you might need the FM capabilities of the radio. You can scan the public service bands, too. The Yaesu FT-814 is a QRP field operator's dream machine.

The K1 by Elecraft

If you don't happen to have $800 for the FT-817 sitting around, or if you are backpacking and need things lightweight, then consider the K1 from Elecraft. The base price for the K1, including your choice of two bands, is $269. The K1 is a dual-band; any two of the ham bands are included in the base kit. You can purchase extra band modules to cover another two bands. The K1 is a very lightweight CW-only transceiver. If you need to conserve weight, then the K1 is the backpacker's dream transceiver.

It's microprocessor-controlled, and uses a very slick digital display to show you what's going on at any given time. You can also add the internal antenna tuner to the K1.

What's nice about the K1, and the FT-817, too, is that they both will produce up to five watts of OUTPUT. It's one thing to run one watt from home. There you have all kinds of wire, aluminum, and towers to squirt your one watt into. Setting up camp by a river may make for a spectacular view, but may not be the best place to string an antenna. When taking QRP into the field, go with at least a chance to be heard, even if it requires you to run a whopping five watts.

The HW-8 comes in third place

If you only want to play radio while the burgers cook on the grill, then the Heathkit HW-8 would be my third choice. It's small and lightweight and easy on the batteries. Although CW-only, it does cover four bands. There's bound to be some activity on one of the four bands at any time day or night.

The HW-8 does have a downside. It will only produce about three watts on 80 meters and about half that on 15 meters. It's not a robust performer when compared to the five watts from the first two transceivers.

It does have a dietlike demand for current from the battery. Standby current is only 100 mA or so. A 7.5 amp-hour battery will last more than a weekend of QSOs.

The monobanders

If I had to pick one band for making QSOs, it would be 40 meters. And my radio of choice for working 40-meter CW at the campsite would be the ARK-40 from S&S Engineering. This rig is built like a tank! It's no lightweight, and I sure would not want to backpack it up the trail. But for use at the campsite, there's nothing better. What I like about the ARK-40 is the ability to dial up a frequency and know that what you see is where you're at. Yes, the goofy push-button frequency selection does take some getting used to, but once you have it mastered, it's not too bad after all!

Right offhand, I don't know if S&S Engineering is still in the QRP kit business or not. I have not heard from them in a while and have not seen any of their ads in any of the magazines for some time.

So, if you can't get one of the ARK-40 rigs, the next choice would be one of the monobanders from MFJ. Available on most of the popular QRP bands, they are assembled, tuned, and tested. They also produce up to five watts of RF into the antenna. Contact your local MFJ dealer for the best price on one of these radios.

If you're into building a kit and want a monobander, then try out one of the kits from Ten-Tec. They are economically priced, coming in at about $100 a pop. They're easy to assemble; even a beginner can do it. These radios produce up to four watts of RF. They all have the famous Ten-Tec QSK break-in keying. The only thing I really don't care for in the Ten-Tec QRP radios is the pot they use as the main tuning control.

The Micro M

Back in 1996, *QST* published my Micro M article. There are hundreds of these things keeping batteries fully charged via a solar panel. At the time the Micro M was designed, I figured most people would use at least a seven amp-hour battery. But, due to the small size of the controller, a lot of guys ended up using very small amp-hour-capacity batteries.

Because the Micro M has a rather hefty

standby current of about 25 mA, it was possible to discharge a 2.2 amp-hour battery from the standby current drain of the Micro M. In effect, you used your solar panel to charge up the battery during the day, and the next morning the battery was dead. During the night the Micro M's standby current drained the battery. With a battery with a higher amp-hour rating, the effect was not as severe. Now, having said all of that, here's a modification you can do to your Micro M charge controller that will reduce the standby current to almost zero!

Micro M standby current modification

"From the factory" the Micro M standby current ranged from 12 to 35 mA. The variance is caused by different production runs of the LM358 dual comparator.

In the past, the best fix was to remove the LM358 and replace it with a micropower version of the chip. They're not cheap and not easy to come by.

But, here is a fix for the Micro M that is simple and easy to do. The results are dramatic! With an unmodified Micro M controller, the standby current went from 33 mA to .118 mA! Here's how to do the modification.

You'll need a 1N4002 diode and 2.2k resistor, and a really hot soldering iron and some desoldering wick.

1. First, position the Micro M PC board so the wire connections are facing you.

2. Locate diode D5 (as marked on the PC board). This diode is located right next to U2.

3. Clip the unbanded lead of the diode from the PC board.

4. Using a hot iron, heat the remaining lead and pull the diode out of the PC board.

5. Using the solder wick, clean out the hole (banded end) near U2. There is no need to remove the other lead left in the PC board. Just be sure you trim it off flush with the board.

6. Install a new 1N4002 diode standing up, with the banded end toward the PC board.

7. Solder the diode's lead in the PC board.

8. Bend the diode's loose end by capacitor C3 and solder it to the unbanded end of the large diode, D4. Be sure you do not allow the lead from the 1N4002 to touch any of the board's traces.

9. Flip the board over and install the 2.2k resistor across the PV- and BATT- traces. Trim the leads to prevent shorting out the board.

10. Check over your work and test the Micro M for proper operation.

OK, here's what we did

We moved diode D5 so it is now receiving power from the solar panel. At night, the entire circuit shuts down. However, since the controller switches the negative side of the solar panel, we need to supply a ground for U2, the regulator.

That's what the 2.2k resistor does. Yes, by connecting the solar panel negative and the battery negative via the 2.2k resistor, some current will flow when the controller turns off the FET. But I measured this at less than 1 mA. So, there's no need to worry about overcharging the battery through a 2.2k resistor!

Check standby current if you like. Place your VOM (set to read current) in series with your battery. You should see about 0.18 mA instead of 33 mA!

Micro M leftovers

Before heading down to the Dayton Hamvention this year, I went through the

Continued on page 62

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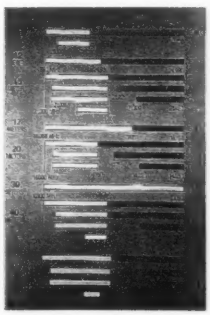

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MixW2

Now, finally, you can download and use the MixW version 2. Large numbers of happy hams are already there. At the time of this writing, it has only been available for a couple of weeks, and it seems as though every other contact, at least, is using the new software.

I have been describing it as having a whole laundry list of modes. By a count, the mode pull-down menu lists 14 digital modes plus SSB, AM, and FM. That certainly fits the description of a laundry list in these parts.

It is hard to know where to start telling the story, with so much available, because it doesn't stop at modes. There is an excellent log system, automated database search (QRZ, RAC, and HAMCALL), plus rig control and antenna rotator control. And, just as a little extra, DXCluster from your local packet cluster or the Internet, your choice.

I had been watching the development of this software from the sidelines and knew it had gone through well over 30 beta versions. Then came the official "pre-release" when the MixW enthusiasts swooped in and found the numerous incompatibilities that crop up with such an undertaking.

That was where I started. The download produced a very compact piece of workmanship at just about an exact megabyte, zipped. Installation went off like clockwork. The author promised that registered owners of previous 1.xx versions could use their registration key on the version 2 and that worked.

Configure wasn't too difficult. The first several releases seemed to give a little resistance to operating the PTT and the rig control. By about the fourth release, life was working smoothly. Suddenly, when I got the last parameter chosen correctly, the software "knew" exactly what frequency I was operating on and turning the tuning knob caused all those numbers to parade, in-step, wherever they were displayed on the monitor.

That is, wherever the cursor was pointed and clicked, the displayed frequency was calculated and displayed in its own little box as well as in the log awaiting the next contact to be logged — along with the mode identifier also in the log and, of course, the date and time.

Then, after seeing all this, I had to try changing frequency and bands and modes and, sure enough, the rig responded to every whim of the software. Just amazing!

So, you may be asking, does all this run on that wimpy computer Jack is so attached to? The CPU in this old shack computer runs 120 MHz and it has 32 Mb RAM. That is a little short of what is recommended by the author, Nick UT2UZ, who claims to have run it on an even slower computer but adds: "Don't try this at home." However, there are published methods to conserve the resources for the computer-challenged ham — and they work.

As a matter of fact, the only thing that doesn't work when using this slightly anemic system is the DX Webcluster. When the modem cranks up, the communications slow to a crawl. I can detect that the connection is in the process but it just doesn't quite materialize. Shut down the modem connection and all is back to normal.

What is so good?

Where the value lies for you all depends on how you look at things. My feeling is that there are two great things this software does for us. The first is that it provides a platform for just about every digital mode any of us has an interest in. In so doing, the activity of at last two modes has risen instantly by some percentage points.

Until MixW2 arrived, I had heard about five Throb signals and worked three of them over a period of maybe six months. Within one week after installing the new software, I had three more contacts and many more "sightings." No one had ever ventured onto 20 meters in that mode that I had detected previously.

A similar percentage applies also to Hellschreiber. Suddenly we are hearing both Throb and Hellschreiber in the general area of 14.078–14.083. This activity is obviously due to the sudden proliferation of easy-to-change-modes-and-use software.

And therein lies a secret of encouraging activity. If you want people to play with new, semipopular modes, put the tools (toys) at their fingertips. Maybe a slightly new coinage of an old phrase would be, "Build it and they will go." That is what Nick did. He performed a labor of love that is sparking interest in modes that were losing ground to the more popular ones.

I heard at least one ham comment that he felt the specialized, single mode software packages offered more in their respective areas. I won't argue with that. One area this may be true in is Hellschreiber. I have worked several stations in this mode and the software works well. There are options missing, however, that help under poor conditions. These are not addressed in MixW2. But it is still getting more users ... just because it is there and it is easy.

There are other examples, I am sure, but this is not a forum to say what is best. That can sometimes be very distracting when we are talking about having maximum fun. I haven't seen or heard a comment from a MixW2 user that didn't include the phrase, "been having a ball." That tells a big story right there.

The other really good thing about the new software is that you can instantly switch modes. I was hesitant in the past to change from one program to another because I heard a mode I wanted to work and couldn't make the change without loading a different program and making some minor adjustments. Sometimes, the only adjustment was to my mental area, as the different packages did not function the same and I would hit the wrong keys.

Now, once the program is installed and the audio drivers are correct for one mode they will also function correctly for the other modes. And, you have more choices, but if you wish, you can use the same macros for all the modes. That really saves mixups for me. I am one big creature of habit. I don't know how many times I have rewritten macros in a program so that they would be the same combination as I had placed in other programs.

Does it work?

Yup, this program does everything it is quietly advertised to do. The PSK mode is usually the first one we look at, and it is as flawless as conditions will allow. It has a very responsive "cure" for those strange RST reports we like to send. I don't use this all the time — because it is one of the resource hogs and is recommended to be left out of the display for the slower machines — but you will see it up and working in **Fig. 1**.

It is intuitive, and the numbers are explained on the screen display so that you know why you are sending those numbers off to the other ham. Along with that is a very well done IMD reading that seems to do the job as well as possible.

MFSK is another mode that seems to be gaining a resurgence of signals with this software. This mode is one of the others the "purists" could possibly argue is better done in the devoted *Stream* software. However, once again, at least half the signals are coming from MixW2 users these past few weeks.

I just happened to think, I worked a station during the testing process in the MFSK mode, for which this mode lends itself very well. There was a station just about directly over the North Pole one evening and there was not a sign of disturbance from "pole flutter." The copy was excellent. I have tried in former times to work stations over the pole in PSK31, and sometimes it is about impossible even with strong signals. (Yes, I worked him.)

And you had better believe that RTTY works. One evening, I heard a very unfamiliar call signing from the island of Nevis, the first I recall ever hearing. I didn't jump in quite as quickly as I should have and suddenly there was a genuine pile-up. So I simply cooled my heels until the big-guns had run their course and this little peanut whistle could be heard. Got right through, and was so proud of the timing and the macros. Like clockwork.

Two new modes have worked their way in during these first releases. One of the surprises was SSTV. At this time it is pretty bare-bones, but I found a few stations transmitting images and they printed perfectly on my monitor. I have not taken time to check out file handling, but it looks as though importing an existing image would be no problem and saving couldn't be very difficult. The secrets lie in editing and slant control. Slant control is provided and image-handling hams can always find a way to fix their pics.

The other surprise entry is MT63. That being a mode I don't see much of at this end of the country, I have not been able to check it out, but I understand that the European hams are enjoying the mode. I would like to see it work on this computer because that is one for which the original software seems to approach my limitation of resources. I am sure I will have seen it work before next month rolls around.

In the midst of writing this column, I happened to tune 15-meter PSK31. This was during May, midmorning in the western U.S., and there was considerable activity with strong traces on the waterfall. I started to pay attention and to make a short story of the experience, I worked five European stations in that mode, one after another.

This does not necessarily reflect on a great program or operator so much as the fact the digital modes, especially PSK31, have come into their own worldwide. As the saying goes, "Everybody's doing it." What that really signals is that it is time to get really serious about what is happening in

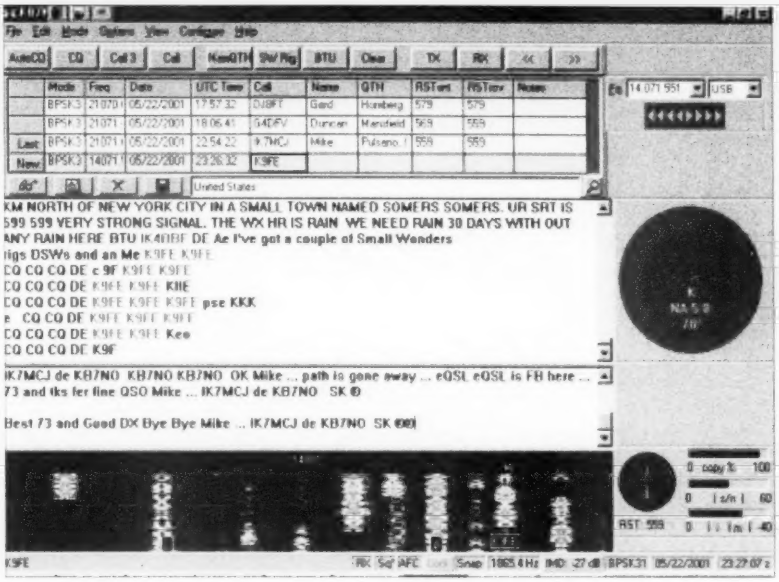
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Fig. 1. Screenshot 1 — This is a basic view of MixW version 2 with about half the bells and whistles displayed. On the right side are three groups, including the world map and the tuning indicator at the bottom right. Due to the low resources available in my computer, I do not usually display the lower two (optional selections from the "View" pull-down). But you will be interested in the great guideline offered by the "RST" reading in the corner. That shows the "honest" appraisal of the K9FE signal at 559. Plus, if you look at the box at the bottom, the IMD is reading a respectable –27 dB. Not much left for argument — well, maybe. After I double-clicked on the callsign in the receive window, it was entered in the log cell. If he had been worked previously or was on my slightly ancient QRZ! disk, the name and QTH cells would have been filled in. If it were a previous contact, it would have been posted in the line just below the log where "United States" is showing. Users of previous MixW software will recognize the map which displays the direction to point the beam for the callsign as entered. The program provides control for automated rotators and would have activated that feature if it were present. Note there are ten obvious signal traces and this is during late afternoon on a Tuesday. The rig control is functioning. MixW calculates the frequency according to the rig readout plus the additional frequency where the trace was clicked in the tuning screen. You never have to calculate again. By going to the upper right tuning indicator, I can change bands, frequency, mode, and sideband, and the Icom rig responds immediately and correctly. At the time of this writing, most popular rigs were doing the same. The program will automate just about everything around the shack (no automated coffee pot yet). Easy and intuitive to use.

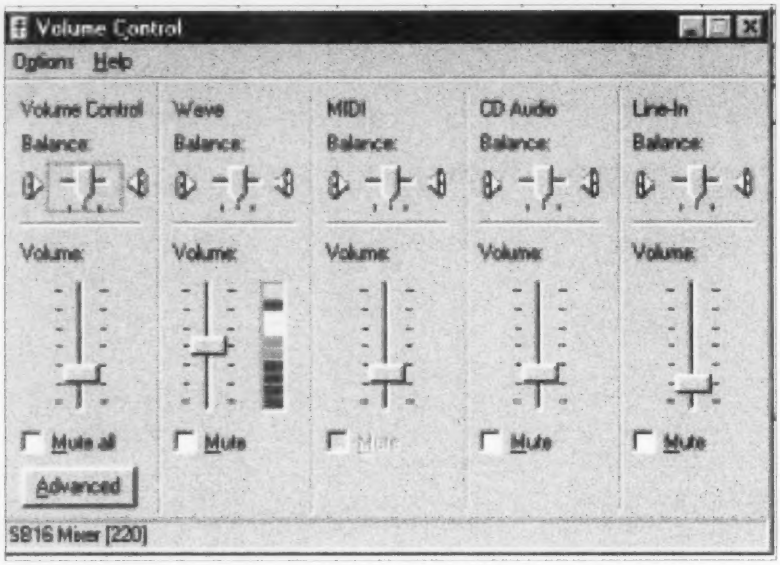

Fig. 2. Screenshot 2 — Here is a working view of the "slider panel" described in the text. Some form of this panel pops up when you double-click the speaker icon on the lower right corner of Windows 95 or 98. The bars next to the second slider from the left identify the control I use, during transmit, to set the Line-Out for transmit. I usually leave the left slider in about this position, though similar results can be had by its use. The most pertinent reference in the article is to the slider at the right. This makes or breaks the tuning window (waterfall) for MixW2. See the text. This panel can be useful regardless of your hookup. I use the bare-bones cable connections from the accessory port to the soundcard and get excellent reports when I get these "knobs" adjusted properly.

ham radio and where it is happening — right here in Digital Land.

What other modes can you work? Well, I could not believe how easily this worked, but I tuned to one of the HF packet bulletin boards, determined its callsign, and asked for a connect. It answered! Nothing hardly to configure. Insert a few callsigns and click.

So just to be sure it was really working, I practiced some of the calisthenics of logging onto to a ham bulletin board and it registered me as a user. By comparison, a few years ago, I attempted to get another system to work packet with a soundcard and never really got it all together. This is just too easy.

To tell the truth, I was thinking, as I did this, about a little nostalgia. Perhaps I might run across a ham to do HF packet keyboard. Didn't happen, but some of the friendly messages being up- and downloaded from the bulletin board sounded a bit like they were live. That was what reminded me of the days of yore.

MixW2 only copies Pactor, no transmit, but I was tuning across a 40-meter Pactor signal and decoded it to find something many of us may be interested in. Someone was receiving their personal E-mail via Pactor from a server on the Internet. I read about this a while back and have been going to research it and tell you my findings. May just get to it now. Anyway, the print was nearly perfect as the Pactor was copied. Of course there is no link, so the print isn't apt to be totally perfect. The mode is Pactor Listen.

Pactor ARQ (linked transmit) will probably never be available in MixW in any version because there is some copyright provision that would have to enter into the cost at the user's end. But it is something most of us can use these dusty old multimodes for to keep them limbered up.

Speaking of multimode controllers, the MixW2 comes with a macro file to address the KAM multimode unit so that you can use your KAM with your MixW2 in terminal mode to work the other modes of your choice and take advantage of the log built into the software along with the other amenities.

I am going to see what it will take to get this to address the PK-232MBX sitting here. There just wasn't time to work that out as yet, and that is a whole 'nother story anyway. But there are a lot of possibilities, as you can see.

Speaking of the log, there are full import and export utilities with the program and it works. I imported the log file from the Logger program in just a few minutes. So now when I double click on a callsign in the receive window, I not only place the callsign in the macro-ready cell, but a search is made for a previous contact as well as search of the QRZ! disk in the CD drive.

And that CD search is at least as fast as if using the QRZ! overlay, especially the first time. Somehow, the access is just short of lightning-fast. I couldn't get this feature to work until I found the folder on the CD to point the MixW2 toward. Now it works like a charm.

Why do you need this?

I suppose you should have this program because I said it is good, but that is hardly a fair case to present. A better reason is because it is going to be the standard that other soundcard software is compared to. What I appreciate is its small physical size. I use that as a measure of quality programming. Enough said on that front.

The good points have pretty well been enumerated above. I would have liked to see it run to its fullest potential on this outdated computer. However, with the cost of computer components receding with the economy, I may just have a high horsepower board in this old girl as soon as the end of 2001. Now, that is saying something! Probably by the time I have risen to the 500 or 700 MHz level, I will still be so far behind the times that I will continue to be ribbed about the Commodore C64 in the shack. (It is actually in the garage. Need some sort of backup, you know.)

The cost of this shareware is insanely low. Unless I am mistaken, they are still selling registrations for $50. It isn't exactly a get-rich scheme. If I had the talent to do this, I would be doing something that paid very well for my time. But then, we are lucky to have Nick who does this sort of thing because he is a ham.

Specific adjustment note

In other related areas, I sometimes realize the "simple" things can bog us down. I don't think I have ever put in writing in this column how to adjust the audio into your soundcard. There are several options. The easiest is to use one of the store-bought interfaces and follow the instructions.

I use the bare-bones home-brew approach between the soundcard and the accessory port on the Icom. These hookups are described in detail in the Help File for MixW2. This simple circuit where you do not use an attenuator and go directly into the accessory port on the radio is a little trickier but doesn't have to be.

Source for:	Web address (URL):
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HamScope — multimode w/ MFSK16	http://users.mesatop.com/~ghansen/
YPLog shareware log — rig control — free demo	www.nucleus.com/~field/

Table 1. *The Infamous Chart.*

Here is what I do. Go to the lower right of your regular Windows monitor screen, find the speaker icon, and double-click on it. If you single-click, you will only get to adjust the speaker volume (which can do the job for Line-out most of the time), but the double-click displays a whole panel of slider controls for the soundcard drivers.

All Windows systems do not have the same panel. I have two versions of Windows95 and one of Windows98 and all three are slightly different. What is fairly consistent is that the significant slider when in transmit mode will have some red, yellow, and green colors displayed next to it. In the case of the panel I view with this computer, I can simply tweak that slider until the ALC stays at zero. The slider in this case is named Wave. Refer to **Fig. 2**. (Sound strange? Read on.)

Naturally, there must be a fly to creep into the ointment during this process. The seemingly same results can be obtained from simply adjusting the slider named Volume. However, I usually leave the "volume" slider up about one notch from the bottom on these systems and give it the final tweak with the one with the colors. This results in very good reports. That counts a lot for popularity in digital modes. Wide signals equal crabby hams — no fooling.

Incidentally, I often find it prudent to adjust the RF power at the rig after the above steps in order to lower the heat. In my case, it is too easy to hit 80–90 watts out. Not only is this power not needed, but it can shorten the life of the finals.

The audio going in the other direction that you are going to receive can be adjusted with a more readily identifiable slider in the panel, in this case named Line-In. One of the reasons I bring all this to your attention is because this is a frequent cause for query and I don't think I ever put this much detail in the column about it.

It is even helpful to know these things if you are using one of the many store-bought, plug-and-play interfaces. I like those. They get a lot of hams on the air quickly and painlessly, but the part I was mentioning about the receive audio may be of use for many of the interface users because:

The MixW2 has something a little different from the average software in the receive spectrum. It is more sensitive and does not have a good readable pattern until you back off that "Line-In" drive. I went the other way at first and thought there was something more wrong with the old computer here.

Then I started watching the reflector and found that others were complaining about reading the waterfall. The final revelation was the sensitivity issue. With MixW2, it is necessary to run that last-mentioned slider near to the bottom of the scale, and you will be amazed at how well the waterfall works.

I think that is about all the editors of this magazine will allow for one installment. There is more. You just need to get in there and see how it works for you. Every setup seems to be a bit different according to what I see on the reflector, but I don't think there is any combination that does not work.

Every now and then someone will send me a question about a slightly different computer configuration, but there is usually a way to make these computers talk to our radios. Some do it more easily and some have slightly better results, but just about everything works with an application or two of logic and patience.

If you have questions or comments about this column, please E-mail me at [jheller@sierra.net]. I will gladly share what I know or find a resource for you. For now, 73, Jack KB7NO. 73

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Bringing RDF and Amateur Radio to Teens

"Ham radio needs more young people." "Early exposure to ham radio leads to a successful career in high-tech." "Using ham radio activities, learning about science is fun for kids." Almost everyone agrees with these statements. Let's meet some hams that have taken them to heart.

To get youngsters excited about Amateur Radio, there's nothing better than on-foot hidden transmitter hunting, also called foxhunting, foxtailing, radio-orienteering and ARDF. It combines plenty of good physical exercise with the technical challenge of using radio gear. There's the intrigue and adventure of discovering hidden objects, plus the challenge of navigating with a map and compass.

"Homing In" has covered my efforts to bring ARDF activities to Scouts and the schools, most recently in the January issue where I described last year's Jamboree-on-the-Air (JOTA) demonstrations. There's an article at my Web site with more ideas for JOTA fun with radio direction finding (RDF). If enough local ham clubs would get involved, including yours, every Scout troop and classroom could experience the fun of foxhunting.

Unfortunately, when I talk to hams who are Scout advisers and schoolteachers, most of them say that they can't do it because of lack of funds, bureaucracy, and so forth. Oh really? This month, the spotlight is on two California hams with a "Never Say Die" attitude that made it happen. Next month, we'll visit some Texans who are achieving the same goals in different ways.

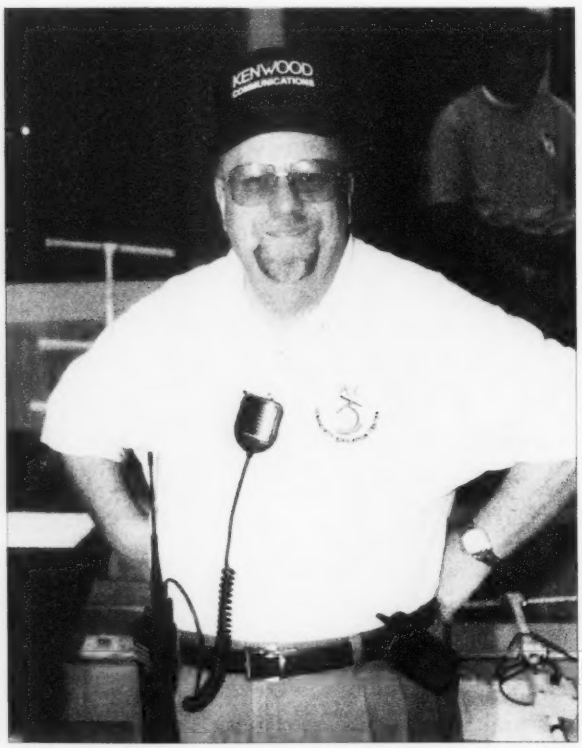

***Photo A.** Mark Hayden KF6DSA, an assistant professor at Pasadena City College, was organizer and primary instructor for this foxhunting project.*

Foxhunting in the Classroom

Mark Hayden KF6DSA (**Photo A**) is a relatively new ham, but he's an old hand at educating young people. "During the week, I teach life science, physical science, algebra, and arithmetic in a high school program at the Community Education Center of Pasadena City College (PCC)," he says. "Most of my students are 18 to 25 years old. They've been out of school one or two years when they realize that they need a high school diploma or certificate."

Mark's interest in ham radio was long-standing, but didn't come to the forefront until about 8 years ago. "I got a grant from a foundation to set up a satellite receiving station at the last school where I taught. Two NASA technicians came out and put in antennas for GOES and polar weather satellites. One was a ham radio operator. He encouraged me to finally get my ham ticket."

KF6DSA saw an opportunity to use our hobby to enrich young people through the NASA Pre-college Science Academy (PSA). "This program gives teens opportunities to improve their math and science in school through extracurricular activities," he says. "And it fosters their interest in science and technology."

NASA-PSA activities are open to all 7th and 8th graders in the Pasadena Unified School District who have scores of 85 percent or higher on Scholastic Aptitude tests in math and reading. They also must be recommended by their school counselor or principal. "Disadvantaged" students are targeted for inclusion. Sessions are held almost every Saturday morning during the fall and spring school semesters. Two Family Forums per semester give parents a chance to get together with the leaders.

There is no charge to students and parents for NASA-PSA. Funding and technical support comes from NASA, the Jet Propulsion Laboratories (JPL), Pasadena Unified School District, and California Institute of Technology (Caltech). In addition to enhancing their math, computer and engineering skills, students get exposure to state-of-the-art technologies such as USA's space program. Dr. Joe Conner, head of

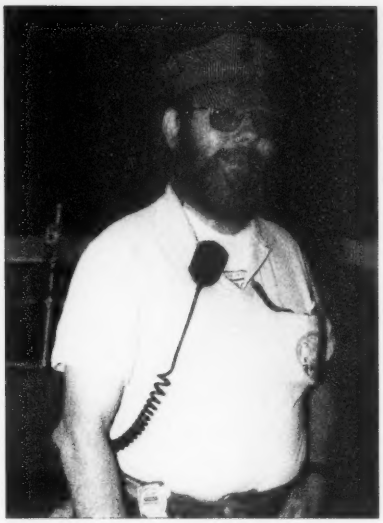

Photo B. *Phil Barnes-Roberts AD6PQ, an Engineering Technical Assistant at Jet Propulsion Laboratories, optimized my offset attenuator design to make it student-friendly.*

NASA-PSA at PCC, is nearing his goal to fund a National Science Tour that will take the students on a trip to the Kennedy Space Center for a Shuttle launch.

Mark's first NASA-PSA project was in the spring 2000 semester. Each student built a simple 20 MHz receiver, the heart of a radio telescope for monitoring RF emissions from Planet Jupiter. Next, KF6DSA wanted to do a radio direction finding project, so he began studying catalogs and the Internet. In March 2000, as he was considering some commercial RDF kits, he attended a Pasadena Radio Club (PRC) meeting where I gave a program on T-hunting and radio-orienteering.

KF6DSA asked for my help in organizing some transmitter hunts for the students. We discussed appropriate equipment and concluded that simple yagi/attenuator/scanner setups would provide just the right technical challenge for the students, at a budget-friendly cost. Unlike the time-difference-of-arrival RDF kits he was considering, yagi-based systems are effective with any signal polarization, give amplitude (relative distance) as well as direction information, and are more sensitive.

For technical support, Mark called on fellow PRC member Phil Barnes-Roberts AB6PQ (**Photo B**). "At JPL, he subjects components and circuits to high frequency radio energy," Mark explains. "He's very knowledgeable." Phil would handle details of the student construction projects, gathering the parts and making kits for the attenuators.

Mark's proposal won Dr. Conner's enthusiastic approval. Funding was provided for yagi/attenuator parts and VHF/UHF scanner receivers, to be retained by the program afterwards. Yagis would be the steel-tape type, from plans by Joe Leggio WB2HOL. Offset attenuators would be based on the design at my Web site. Sessions would be in Mark's classroom at the Community Education Center, about two miles from the main campus.

Attendance at the spring 2001 semester was greater than before because some participants in the Upward Bound program joined in. Upward Bound is funded under federal TRIO programs by the US Department of Education, with the goal of increasing rates

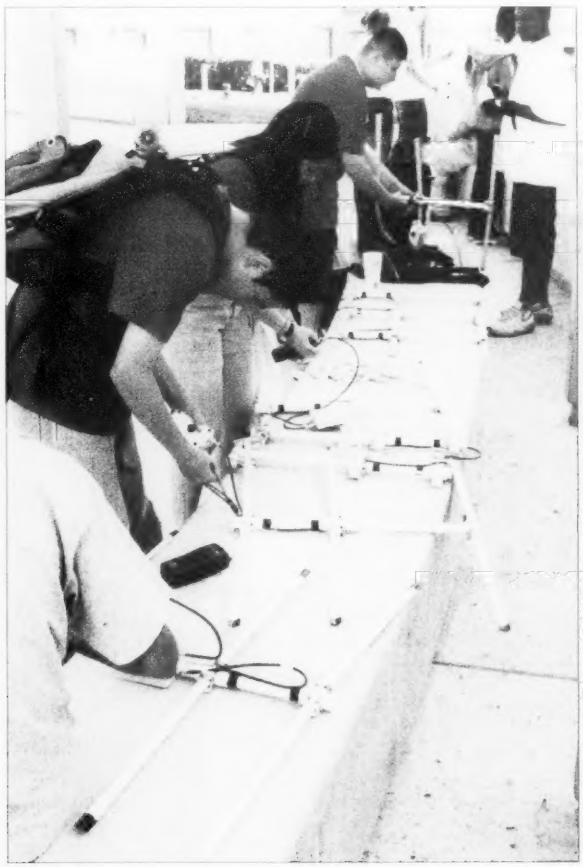

Photo C. *At the equipment testing session, students discovered that it's hard to take bearings while carrying a yagi, attenuator and receiver separately. After that, we decided to put handles on the yagis and mount the attenuators to them.*

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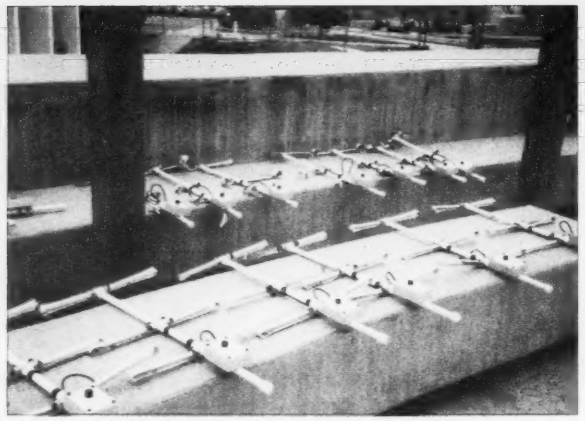

Photo D. *Some of the completed steel-tape RDF beams with attenuator boxes mounted to the handles, ready for the hunt.*

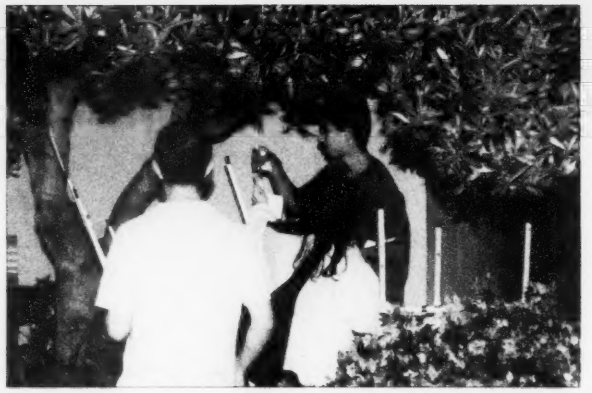

Photo F. *It's in the tree! NASA-PSA students discover one of the practice transmitters and mark their frequency sheets with its orienteering punch to prove that they found it.*

at which teens enroll and graduate from colleges and universities. Students must either be from low-income families or be potential first-generation college students.

On the first class day, Mark and I introduced a room full of eager youth to the world of RDF. We showed them how hams use it for fun (T-hunting and radio-orienteering) and for serious purposes (tracking accidental and deliberate interference). We told them about other important RDF uses, such as finding downed aircraft with Emergency Locator Transmitters. Mark gave each one a 3-ring binder full of articles about direction finding, Amateur Radio, and the projects they would be building.

Photo E. *A student programs the fox frequencies and associated offset frequencies into his scanner.*

That was the last time I saw the students for several weeks. Their next session was a tutorial on soldering and construction techniques by Naomi Garcia, a PCC vocational instructor. After that, they set to work on their RDF equipment under the guidance of Mark and Phil.

AD6PQ modified the attenuator layout to fit in a larger plastic box, making construction easier. "For safety and consistency, we drilled the attenuator cases before the students got them," Mark explains. "We also pre-cut the perfboard and drilled holes for potentiometers and BNC connectors. Everything else was done by the students. They built the antennas completely by themselves, including cutting the PVC pipe and the tape measures."

Hunt Day Arrives

I considered some large parks and recreation areas near Pasadena for the NASA-PSA ARDF sessions, then discovered that the main PCC campus is perfect. It has plenty of flower beds and shrubs to provide concealment. The buildings provide just enough multipath and signal blockage to make it a suitable challenge.

For the students' first radio-orienteering experience, I put out three practice transmitters, to be followed by a 5-fox course with international-rules timing (each fox on for 60 seconds, in sequence). The practice foxes were concealed but within 100 yards of the Sculpture Garden start point. The other five were scattered throughout the 53-acre campus.

It took a few minutes' practice for students to learn how to hold their antennas straight out, not pointed up or down unless they thought that the foxbox was in a tree or on the ground right next to them (**Photos C** and **D**). The scanners bought by the program didn't have S-meters, so the teens soon figured out how to use FM signal quieting to determine the direction to the hidden transmitter. They got the hang of tuning 4 MHz up or down to the offset frequency when the signal got strong, increasing attenuation as they got closer, and estimating distance from the setting of the attenuator (**Photo E**).

Once they gained some confidence in their RDF abilities by finding the practice foxes (**Photo F**), they were ready for the main hunt. April WA6OPS timed them individually as off they went on their first

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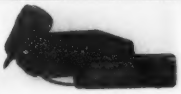
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By Eric Shalkhausser W9CI, SK

The History of Ham Radio

Parts 9 and 10: Portable and mobile, more experimenting.

In the early 1920s, in order to be truly portable a radio receiver had to be fairly light in weight, have a degree of efficiency, and be designed so that it could be moved about with ease. It was dependent, above all, on some type of portable antenna. Reliable operation and portability were the basic criteria.

The antenna was of the loop type, of modest dimensions, and foldable. Dry "A" cells were the only source of sufficient current required for the filaments of the vacuum tubes. The plate supply depended on "B" batteries. The batteries contributed the major weight. The older UV 200 and UV 201 tubes were replaced by UV 199 and the WD11 tubes which did not require as much filament current, thus lengthening the operating life.

Using a loop for reception posed somewhat of a problem. The loops used had distinct directional characteristics. A loop had variation coverage as much as five to one forward compared to the sides. During the summer months, general activity among radio amateurs was not only down, but rather drab and unenthusiastic. QRN and static prevailed with regularity, and activity was carried on the assigned wavelength of 200 meters (plus or minus).

Reprinted from *73 Magazine for Radio Amateurs*, August and September 1979, where this was originally reprinted from *QCC News*, a publication of the Chicago Area Chapter of the QCWA.

The broadcast listeners had the evening hours with little or no amateur QRM to contend with. The agreed upon hours of silence were regularly observed by the amateurs. Summer activity was usually looked upon as putting a damper on most ham transmitting. It was a time to take inventory of equipment to rebuild and update for the coming winter season.

Whenever radio amateurs were involved in a project, ingenuity prevailed. A.H. Grebe, the well-known inventor and manufacturer of the CR line of receivers known and used by most amateurs during the twenties, went portable in a big way by giving the loop advocates an eyeful. He preferred to stay with the usual design—flat top, multiwire model—in spite of the limited cruising mobility (**Photo B**).

The aerial with autobody-counterpoise configuration was preferred over a loop to avoid specific directivity. When ready to dismantle the outfit, what did Mr. Grebe devise? The entire overhead system was slung under the running board (cars had large running boards in them days) on hooks provided for that purpose. Instead of using dry cells, a storage battery was available for the heavy drain required for the tubes.

Photo C illustrates what was available for radio entertainment while visiting the famous boardwalk at Asbury Park, NJ: the Roller Chair Special. The apparatus consisted of a radio chair so compact that three persons could sit comfortably side by side in the seat. A loop of the flat type was connected to the detector-amplifier held in the laps of the travelers. No coils were used, all tuning being accomplished solely with the variable condenser. Signals from stations over 200 miles distant were heard. Such sets were effective for wavelengths of 300 to 500 meters, and good results were often had at wavelengths up to 800 meters.

A more practical and somewhat more compact, all-around enclosed model of portability consisted of a receiver using a popular circuit known as a Grimes "Inverse Duplex" (**Photos D** and **E**), having four tubes of the WD11 type. The set had a wavelength tuning capability of 200 to 3500 meters. The particular instrument shown in **Photo D** was transported to the Philippine Islands in 1924 and served a lumber mill owner for years. It traveled

THE AUTO RADIOPHONE

By A. H. GREBE

Photo A. A.H. Grebe's portable rig.

by motorboat and other sundry conveyances over the broad island and mainland areas, giving the owner contact capability with his home base. The receiver was used in connection with a kW spark transmitter.

Legislation Problems Unsolved

The very rapid expansion of radio broadcasting during 1922–1923, together with the great demand for receivers and the need for some semblance of interference control, pressured legislators in Congress to come up with an urgent solution. The folks back home demanded action.

As a result of the first radio conference, held in Washington in the spring of 1922, Congressman White of Maine introduced a bill known as the White Bill, HR 11964. For almost a year thereafter the bill was periodically under discussion, often under review, but constantly in the minds of the radio amateur.

On January 2, 1923, almost a year after the White Bill was introduced, the ARRL President, Hiram Percy Maxim, went to Washington for a hearing on the bill. He was instrumental in bringing to bear on the legislation the opinions and recommendations of the amateur fraternity. It was the ARRL up in front, promoting action and showing great interest in bringing about an equitable solution to the problems confronting listeners, the broadcasters, the commercial operators, and the thousands of amateurs. But speaking in behalf of radio amateurs in particular, it was Mr. Maxim's foremost objective to ensure that amateur radio would continue to have its rightful place.

The White Bill contemplated legislation to broaden the wave band for broadcasting so that the service could grow, expand, and perform in an orderly fashion, an action that was required so that Secretary of Commerce Hoover could be given authority to properly regulate radio in the United States. The bill was carefully analyzed, several

Photo B. A good view of Grebe's portable antenna system.

Photo C. The Roller Chair Special.

recommendations and amendments were proposed, and suggestions were offered in an attempt to bring the listener and the radio amateur into accord. It was hoped that commercial interests would not be the dominating influence in this free and open domain, the ether.

However, in the end, what happened?

The White Bill, HR 11964, passed the House on January 31, 1923, went to the Senate, and there was referred to the Committee on Interstate Commerce. Because of considerable outside opposition to various provisions, the bill languished and finally remained to die with the expiration of the 67th Congress on March 4, 1923.

Sensing trouble, and knowing the general attitude taken by many interests in the bill, White introduced a new bill on January 11th, with certain modifications proposed. It included provisions somewhat more palatable to the objectors. The new bill was introduced as the White-Kellogg Bill. It also died in the face of considerable opposition. This virtually ended the hopes of all concerned to patch up the old 1912 radio law and bring order out of a simmering and ongoing chaotic situation.

On March 20, 1923, Secretary Hoover called his Radio Telephone Conference members to review the situation, hoping that a solution could be found to administratively cope with a defiant muddle. It was paramount that a way be found to open up more wavelength channels for broadcasting. The second National Radio Conference thus came to order.

In the meantime, amateurs, again caught in the middle but constantly cooperative, commanding the staunch support of the Secretary, had devised a so-called "Rochester Plan." The plan specified that in communities where QRM would be considerable and above normal in volume, quiet hours would be observed between 7 and 10:30 in the evening in all zones throughout the country, especially in the more heavily populated areas. At the conclusion of this second conference and after months of deliberation, a schedule evolved and was recommended. (See **Table 1**.)

Amateur activities on the rise

Amateurs were beginning to discover, through their constant experimenting, that wavelengths below 200 meters had possibilities not to be denied. The vacuum tube and the associated circuitry developed led the experimentally-minded amateur into unexplored fields. He discovered that by using vacuum tubes instead of spark gaps he was able consistently to span distances with ease and much less

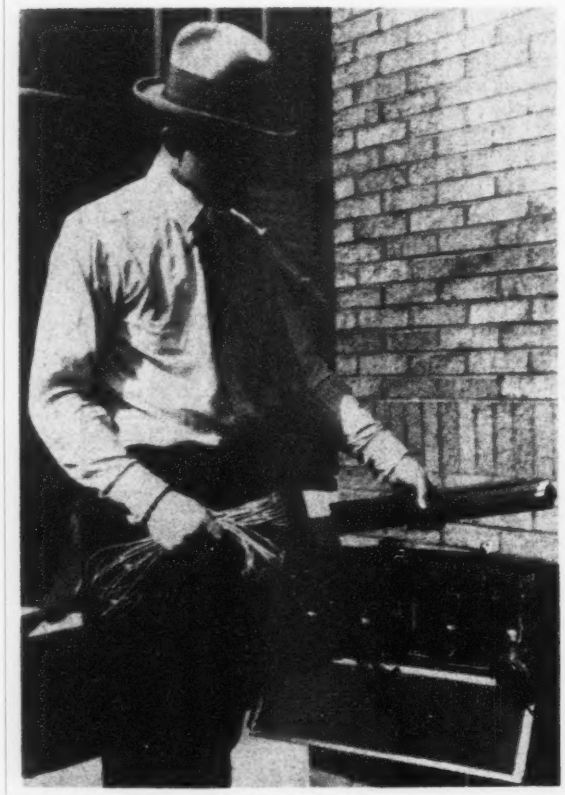

Photo D. *A portable receiver which used the Grimes "Inverse Duplex" circuit. Starting in 1924, this particular set was used for many years by a lumber mill owner in the Philippine Islands.*

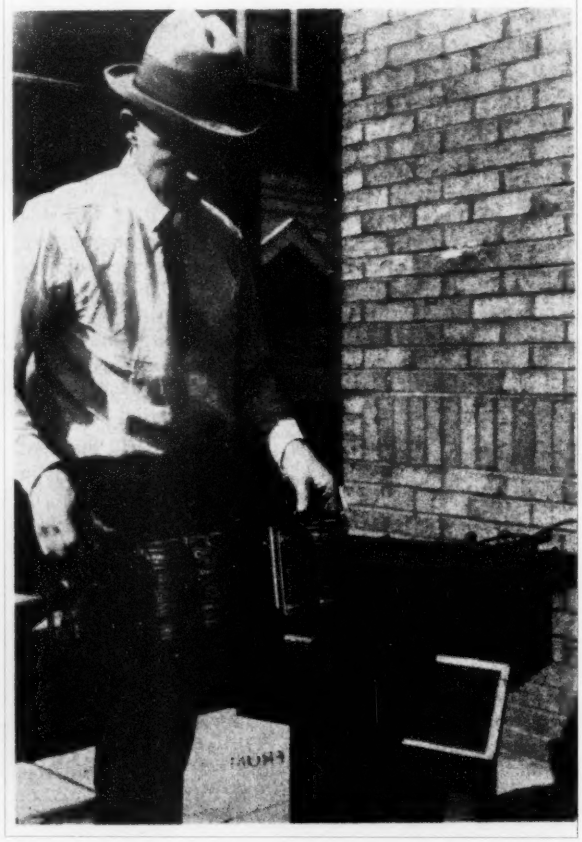

Photo E. *The power pack contributed the major weight to these portable units.*

power on his assigned wavelengths. Dropping down below 200 meters had tremendous possibilities. All of the early tests engaged in between individuals in various parts of the country were usually planned in advance and followed a schedule. Practically no one was listening below 200 meters. Nobody had a receiver at this state of radio progress, nor the capability to tune down much below 200 meters. With no signals on the air except by prearrangements between individual operators, there was only static to be heard. The ether was just an empty void below 200 meters and was generally avoided.

Below 130 meters	Available for special licensing
130 meters	Government, CW, exclusive
130–143 meters	Available for special licensing
143 meters	Government, CW, exclusive
143–150 meters	Available for special licensing
150–200 meters	Amateur, CW, ICA, phone, spark, exclusive
200–222 meters	Special amateur, technical & training schools, CW, exclusive
222–231 meters	Aircraft, CW, ICW, phone, nonexclusive
231–286 meters	Class B broadcasting, phone, nonexclusive
286–288 meters	Reserved
288–300 meters	Class A broadcasting, phone, exclusive
300 meters	Marine, CW, ICW, spark, nonexclusive
300–450 meters	Class A broadcasting, phone, exclusive
450 meters	Marine, CW, ICW, spark, exclusive
450–545 meters	Class A broadcasting, phone, exclusive
545–674 meters	Marine & aircraft, CW, ICW, spark, exclusive
674 meters	Government, CW, nonexclusive
674–800 meters	Marine & aircraft, CW, ICW, spark, exclusive
800 meters	Radio compass, CW, ICW, spark, exclusive

Table 1. *Schedule evolved from the 2nd National Radio Conference. Class A and B broadcasting stations were assigned a wave band of 10,000 cycles, none closer together than 20 kilocycles in frequency. Within each area zone there would be ten stations separated by 50 kilocycles.*

As the amateur slowly ventured into the lower unexplored regions, he faced one common question, namely, "Will the efficiency of the tubes I have available decrease as the wavelengths become shorter?" He knew that the larger tubes were still quite inefficient in design and the circuitry lacking in development. Many amateurs could not be convinced that "below 200 meters" was a fertile field in which to risk expensive "bottles." This area also was unsuited to the tuners used, and besides … the antenna he was using was too long, and nobody could be heard with whom to communicate. The League at Hartford had a great deal of convincing to do and a great many illusive misgivings to overcome among the majority of hams. Most amateurs were unwilling to let down their old multi-element aerials, disconnect the ammeter from the antenna lead, or trust the plain Hartley transmitter circuit. There was still an amount of extraordinary experimenting ahead.

Wavelength vs. frequency

Another major stumbling block in the way of progress was evident. This was the fact that nobody knew or was seriously concerned about how to make wavelength measurements. Up to this time, very little reference had been made to the term *frequency*, nor much attention paid to conversion from wavelength to frequency. Conversation among radio men held rather tenuously to *meters*. Not until the League convinced the radio division of the Bureau of Standards that by transmitting measured frequencies over their Washington station, WWV, for amateurs to copy and adjust circuits to conform to, would the ice be broken. So, from this time on, the wavemeter gradually became the most important laboratory instrument in the ham shack. Schedules were now arranged to have transmissions from WWV appear periodically, set for eleven p.m., EST on specified wavelengths and frequencies. They provided calibration settings for all home-built wavemeters, permitting the receiving tuners to be modified, rebuilt, or redesigned for receiving the higher frequencies. A new and important era in amateur radio was now set in motion with vigor.

***

The Second Radio Telephone Conference, called by Secretary Hoover, convened on March 20, 1923, to solve the deplorable situation brought about by the controversy over wavelength assignments. Broadcasters, the amateurs, the Army and Navy, the ship operators, and the commercial interests could not come to a common agreement as to wavelength allocations and thereby avoid woeful interference. Clearly, from an administrative standpoint alone, the broadcast listeners were desperate. The impasse which existed required a solution.

After several months of meetings, serious discussions and lengthy deliberations, not even the amateurs had guidance or a clear go-ahead on how to interpret their standing with the Commerce Department. The American Radio Relay League had made a series of suggestions. The amateurs in all parts of the country, now almost 21,000 in number and licensed to operate in the narrow 200-meter range, found solace in the fact that they had pooled their ideas and suggestions through their respective district directors.

The ARRL Board of Directors based high hopes on all of these inputs. So, when recommendations were issued on June 28, 1923, by the Department of Commerce in the form of General Letter #252, directed to all government district radio inspectors, they read as follows:

C.W. Licenses

DO you fellows know that your station license provides that the apparatus described in the application shall not be changed without permission? And that a license granted a spark station is not good for the use of C.W. equipment? It sounds queer, considering that any complaintant ought to prefer a tube set to a spark, but if anybody wants to "get" you on it they can.

A broadcast listener recently filed a complaint with a radio inspector against a well known eastern spark amateur, alleging the use of an illegally broad and too-long wave. Called upon the carpet, there was no evidence that his spark, which was good as such animals go, was not entirely legal. But he volunteered the information that he was experimenting with C.W. anyway and the interference probably would be still further reduced. Whereupon, altho his spark set was O.K., he was informed that the use of C.W. was in violation of his license, and it was suspended for three months.

Moral: If the equipment you are using is greatly different from that for which your license was issued, take up the matter with your Inspector and "get right."

QST - March, 1923

Photo F. *A notice from* QST, *March, 1923, warning against using spark rigs for CW.*

"General and Restricted Amateur Radio Station Licenses will be issued permitting the use of any type of transmitter (CW, spark, ACCW, ICW, SC, and phone) with the restriction that when using pure CW, they are authorized to use wavelengths from 150 to 200 meters. When using spark, ACCW, ICW, unfiltered SC, and phone the wavelengths from 175 to 200 meters only can be used. The types of transmitters must be specified in the application and the license.

"Special Amateur Radio Station Licenses will be issued permitting the use of pure continuous wave transmitters only, authorizing the use of wavelengths from 150 to 220 meters.

"For the purpose of application of Amateur Stations, pure CW is defined as follows: A system of telegraphing by continuous oscillations in which the power supply is substantially direct current as obtained from (1) a generator, (2) a battery, or (3) a rectifier with an adequate filter. (A filter is not deemed adequate if the supply modulation exceeds five percent.)

"On licenses issued for Amateur Stations you will include the following: 'This station is not licensed to transmit between the hours of 8:00 and 10:30 p.m., local standard time, nor Sunday morning during local church service.'

"Special Amateur Stations must be operated by persons holding an extra first class grade Amateur operator's license, or a commercial extra first class operator's license. Applicants must also meet the requirements of Regulation 63.

"A new class of Amateur operator's license is hereby established, to be known as 'Amateur Extra First Grade.' Licenses of this grade will be issued to persons passing the required special examination with a percentage of at least seventy-five and code speed in sending and receiving at least twenty words per minute, five characters to the word; who have had at least two years experience as a licensed radio operator; and have not been penalized for violation of the radio laws subsequent to the date of these regulations."

The government supervisors, located in the several United States radio districts, upon receiving the new regulations, were requested to notify all amateur radio licensees, general and restricted, to submit their respective license papers to the supervisor's office and have them modified in accordance with the new regulations. After they were so certified with a copy of the new rules appended, they were returned, officially endorsed, extending the wavelengths range and specifying the quiet hours. No changes were made in their expiration date.

All amateurs who held *special* licenses were notified that their licenses were canceled and new licenses would be issued in accordance with the new permits now granted. Up to the present, all amateur licenses were issued specifying the wavelength of the operating transmitter to be used. From this date on, a license permitted a station to change the operative wavelength to accord with the bandwidth permitted and as the type of emission specified.

Variable frequency transmitter circuits were not generally known among amateurs. The progress of the art and the know-how was still lacking in 1923 in this respect. Even the well-informed and up-to-date amateur solved the changing frequency problem by having more than one transmitter available, usually a pure CW of low power and another with either ICW or ACCW plate supply. Every license issued by the Commerce Department required that the licenses specify not only the wavelength limits of the transmitter, but also the emission type and the apparatus to be used, including the

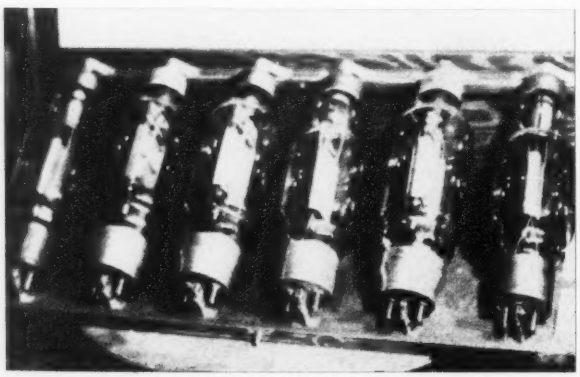

Photo G. *The 250-watt UV204.*

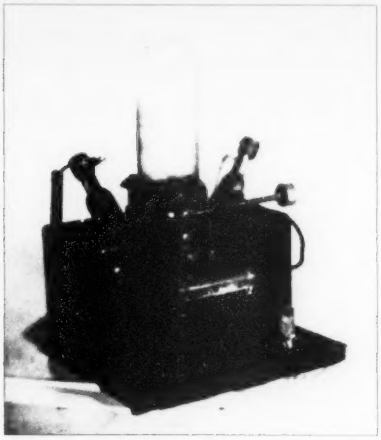

***Photo H.** A one-kilowatt transmitter.*

antenna length and construction. If an amateur qualified as an extra grade operator, he could apply for two licenses, a special and a general. The special was then given a "Z" call.

The ARRL had recommended that the amateur with two years of experience and a twenty-words-per-minute code speed be issued an extra first grade amateur operator's license using a wave transmission length up to 220 meters. (Even at this date all authorities assumed that this stipulation was a decided advantage for DX.)

It also was understood that transmissions on wavelengths other than 200 meters by the amateurs could be allowed on the issuance of a license specifically noted on the application. A second wavelength, perhaps somewhere between 175 to 180 meters, could be granted. The 150 to 220 meter band specified in the 1923 Regulations gave the Secretary authorization to grant licenses upon request provided the amateur could meet the stipulated requirements and so requested in his application.

How the need for "plate" power was met

In the early wireless days, the conversion from simple spark coil to high voltage rotary-gap transmission was not difficult. But going over to the vacuum tube for CW operation was by no means an overnight accomplishment. To put continuous wave power into the antenna, the amateur initially had available a small amplifier tube and a larger five-watter, known as the UV202. Subsequently the fifty-watt 203 was available, followed soon by the 250-watt UV204, a real "powerhouse" for most DXers (**Photo G**).

With the introduction and development of the power tubes, there naturally was need for a direct current supply to energize the plate circuit. Much of the spark gear the amateur had accumulated and used for a power source was now destined for the surplus stockpile. The new regulations specified pure CW or nearly so, and this necessitated some type of direct current source, often up to several thousand volts. Various methods to obtain this voltage were outlined in the ham literature: (1) a motor generator, or (2) a battery, or (3) a type of rectifier with filter. Much experimenting took place. This voltage was referred to as the "B" voltage supply

The Motor Generator

Although not the most practical source of high voltage DC nor the least expensive, a generator was the easiest and simplest way to quickly come up with plate power of one- to two-thousand volts. The ESCO machine from Electric Supply Co., of Stamford CT, could be found in many ham shacks. Early commercial broadcasters also used this equipment. However, the supply required filtering to reduce the ripple modulation to a point where it would meet the specified five percent. Using a motor generator required AC starting controls, considerable power wiring, and usually a remote and out-of-the-way installation of the entire

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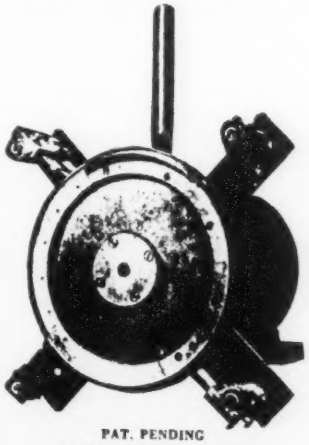

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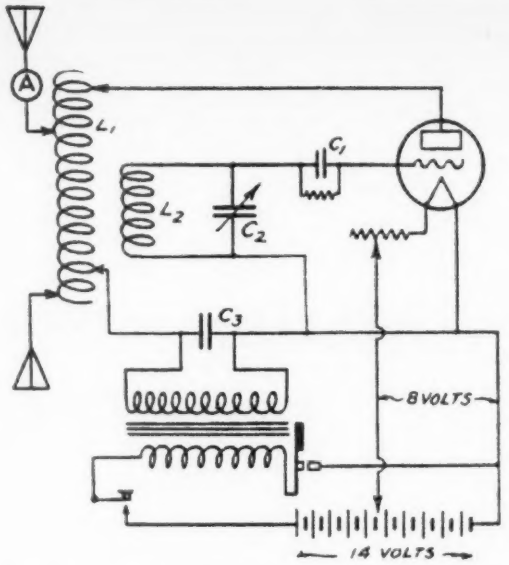
Just an Efficient and Reliable Form of Rectification

***Photo I.** A synchronous rectifier.*

With a half inch spark coil a hard receiving tube may be used; either the Cunningham C.301 or the Radiocorp U.V.201 is suitable. For larger coils the 5-watt C.302 or U.V.202 may be used but less filament power is consumed by the Western Electric "E" or VT-1 tube. No 50-watt tube with proper plate insulation for spark-tube work is available just now but the C.303 or U.V.203 can be made to do.

Various circuits have been described in our pages in a paper called "A Spark Coil C.W. set," by Samuel Kopelson of 2BCF (May 1922—p. 66), and in "A Spark Coil C.W. Transmitter," by F. J. L. Duffy (March 1922—p. 28). In *The Modulator* for January 1923 there appeared on page 17 a concise paper by M. Joffe describing his spark-tube set at 2BYO.

The best plan of all is to remove the secondary entirely and re-wind the coil with wire 6 or 8 sizes larger. Robert Kraus of 2CEI finds that for a Ford spark coil the best secondary is one having 5000 turns of number 32 A.W.G. (B&S) double-cotton-covered wire. When the secondary is re-wound in this fashion no shunt condenser is needed in Fig. 4 and even for the other circuits it can be reduced to .001 microfarad. Three sheets of 4 x 5 tinfoil between 5 x 7-inch glass sheets 1/8 inch thick is more than enough.



L1—25 turns bare No. 10 wire on a 5-½ inch tube.
L2—20 turns No. 18 S.C.C. copper wire on a 3 inch tube.
C1—Mica condenser of .00025 to .0005 microfarads capacity.
C2—Variable condenser, .0005 microfarads.
C3—Glass or other sending condenser.

Photo J. *Specially wound spark coils.*

unit to reduce hum and noise when operating voice modulation. Weight and expense were responsible for the few installations of this kind.

Edison and lead-acid batteries

Edison-type batteries were available built in small but compact units. They were kept charged with a Tungar charger-rectifier connected to house current. The lead cells could be obtained in compact assemblies giving sufficient wattage for the smaller transmitting tubes. All these units were messy and, besides giving off a gas odor, ruined many floors and carpets.

Typical of what certain amateurs were capable of and determined to build is illustrated by the enviable installation of radio NU9BHT. This beautiful layout required assembling and building one thousand individual lead-acid cells. They were contained in 4-1/2" x 5-1/2" hard rubber cases, with one positive and two negative plates per cell. Hard rubber trays contained 25 cells each and were treated with acid-resistant paint to provide protection and longevity. With each bank delivering 50 volts, separate switches were used to make appropriate connections for charging each bank, either separately or in four bank series of 200 volts. A motor generator battery charger delivering 250 volts kept the batteries fully charged.

Installations of this type necessitated adequate ventilation, care, considerable service, and a separate building to house the equipment. the circuit diagram of the station transmitter adapted itself to frequent modifications and changes to keep it up-to-date.

With the development of crystal control and other experimental features added from time to time, NU9BHT established an enviable record while in service. Operating primarily on 40 meters CW and occasionally on 20, as an official ARRL relay station, it contacted all Australian districts, making five-continent QSOs in one evening. This was an exceptional accomplishment back in 1923. Not many installations of this type prevailed in hamdom. With a battery voltage source no filtering was required. This was *pure* DC!

The rectifiers, mostly chemical

Over the next few years, the various amateur publications carried a series of suggestions for methods of building rectifying equipment for the B supply.

How did the amateur go about putting together a chemical rectifier? He was on the lookout for—item one: chemically pure aluminum sheets; item two: chemically pure sheet lead; item three: a quantity of pint-sized jars; item four: several pounds of borax; item five: plenty of distilled water.

For each cell assembly he figured that approximately 40 volts could be rectified from a 60 cycle source. This translated to about 50 cells required for a 2000-volt output. Forming and placing such a home-built rectifier initially into operation required a great deal of experimenting to overcome a whole series of mishaps. Rectified AC output of this type was always

accompanied by a 60-cycle ripple hum, which had to be adequately filtered before it could meet the prescribed specifications—especially if it was to be used for a near-pure CW purpose. Filters were needed to eliminate key clicks. With batteries, there was complete absence of blinking lights, buzzing, whining, vibrating generators, and many AC growls on the air.

Other substitutes for B supplies

A convenient and inexpensive unit known as the mercury arc rectifier, equipped with an electrolytic "keep-alive" mechanism, was extensively used to give up to 3000 volts of B supply power. Both voltage and current outputs satisfied a one-kilowatt transmitter (**Photo H**).

Also available was a synchronous rectifier, as shown in **Photo I.** A synchronous motor, 1800 rpm, carried a large-diameter split wheel, with which two husky commutator brushes made contact. In this way, the 60-cycle current was rectified and the pulsating directional output then filtered. These units were marketed under the name of Super-Sync and provided plate energy rated at up to 4,000 volts.

Some of the early plate supplies were obtained from specially-wound spark coils—see **Photo J.** Such transmitter assemblies put out an ICW signal, were extensively used, and solved the high-cost problem. It was necessary to adjust the vibrator frequently to obtain a smooth tone, the pitch being immaterial but often adjusted to satisfy the contacted operator at the other end.

Radio amateurs in the early 1920s were an experimental and ingenious lot. They solved their problems in the best amateur tradition. 73

NEVER SAY DIE

continued from page 7

Well, what does that leave us? Diplomacy? Har-de-har.

One thing we've sure learned in the West is that money talks. Money from our big industries has total control of Congress and the White House. It was a slow, sneaky shadow win, covered carefully with propaganda (a.k.a. advertising and PR).

We suckers dutifully roar, running after the waving red flags like bulls, unaware that we're puppets being strung along. We're, and this includes most of Europe too, being manipulated. We're being entertained with baseball, football, soccer, basketball — with a media totally owned by the same group that's pulling Congress's strings, chasing after more entertainment for us. Like political campaigns or the latest Simpson or Lewinsky scandal.

Is the situation hopeless? Not at all. I see a revolution coming which can change everything! It can take the big foot of government (currently America's fastest growing industry) off our necks. It can cut our government back to that envisioned by the framers of the Constitution, where taxes are more on the order of 2% instead of 50%. And it can do the same for the people of China, North Korea, and so on.

So what's this big revolution?

It will start here in America. And, like the computer and compact disc revolutions, I hope I can be up front helping to lead the way.

With the development of the digital video disc (DVD), we have a way to provide hours of high quality video on a small (and getting smaller) disc. The revolution will start out, I suspect, with a few companies providing alternative ways for kids to learn to read and write, then arithmetic and the other stuff kids are being exposed to in public schools. Parents will get these courses at first as a way to help their children do better in school. But soon these DVD courses (or programs) will have a life of their own.

The programs will have professional actors instead of the grade school teachers we're used to. The programs will be written by top-notch writers, aided by

Continued on page 58

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NEVER SAY DIE

continued from page 57

state-of-the-art graphics. Have you seen *Shreck* or *Dinosaurs*? The programs will be so much fun that kids will gobble them up and be looking for more.

PBS has been showing the way with some marvelous history programs — about our wars, our presidents.

We'll be seeing ads for these DVD programs on TV. I was roundly ridiculed when I predicted back in 1975 that one day we'd see ads for computers on TV. Yeah, sure.

The programs will expand to cover all school subjects, and then on to programs on anything else youngsters will want to learn about. We'll see adult learning programs, plus programs to help us learn skills. Thousands of programs. And all available dubbed in *any* language. Including Chinese and Swahili.

Here's learning at a fraction of the cost of today's school system, and easily a hundred times better.

No government can keep down an educated and motivated citizenry for long. I just hope that our educational revolution comes along in time to bring so much prosperity to China that they're able to throw out the communist leaders.

Education, brought to Africa, will help those countries get rid of their dictators and despotic governments.

Now, being practical, I believe this revolution can be triggered by a publication, just as my publications sped up our having cell phones, personal computers, and CDs. It'll take about a half of a million dollars to get such a publication nationally distributed. Know anyone with a half mil and an interest in totally changing the world? Yes, of course I've done a business plan already.

Government

Government doesn't work. It doesn't keep our streets safe and it doesn't educate our children. Government is good at only one thing: It breaks your legs, hands you a pair of crutches, and says, "See, without us you wouldn't be able to walk." — Harry Browne.

Art Bell

In December I went to Pahrump NV to visit Art. Wow, what a ham setup he has! Pahrump is way the hell out in the desert. Flat, with mountain ranges around it. Art's hundred-foot tower made his home easy to spot from a couple of miles away. He's got satellite dishes, big and small, and plenty of emergency power.

There's a wind generator, a big bank of solar cells, and a propane-powered generator with about 600 gallons of fuel. If anything serious ever happens Art's station will be the last to run out of power. He's got hundreds of satellite channels for entertainment.

He does his Coast-to-Coast AM radio show from his ham shack, with video cameras all around the room to provide live video via the Internet during the show. Well, semi-live — he just sits there and talks.

We got on the air and made a short contact with a ZS6. He'd never heard of either of us, so it was a routine contact.

I caught Art and Ramona just before they were leaving in their RV for a trip to California. And what an RV! Ham radio? Of course! Satellite TV that automatically follows the satellites no matter how the RV turns? Sure. Built-in computer? Of course. Huge.

Thrifty Wayne

I'm *not* cheap ... I'm, er, thrifty. I love to shop in the Dollar Stores. If we had 99¢ stores in New Hampshire, I'd be checking them out, too. Then there's the Building 19 chain of el cheapo stores. I can't pass one by. I've gotten some great books there, marked down to one to three bucks. I buy a bagful. That's where I get my reading glasses for two bucks. No sales tax here in New Hampshire, either.

How can China make watches ... perfectly good digital watches ... that sell for a dollar? My Rolexes are retired. The only downside is that I do have to take the watch off when I take a shower. It isn't waterproof. But, for a buck? So what? I solved that problem easily ... I cut down on my showers ... as you may notice if you stop by to visit unannounced.

They have an even bigger bargain at 19. For five bucks you get the dollar watch, plus a Chinese imitation of the Swiss Army pocket knife, and a fold-up pair of pliers, with wire cutters, a knife, screwdriver, bottle opener, can opener, file, and saw. Folded up it's 3 x 1.5 x 0.5 inches! Just what you need in a kitchen drawer or a glove compartment. The little knife is always in my pocket and gets used dozens of times a day ... like opening cartons and prying tape off inkjet cartridges to refill them. It has a knife, scissors, and a file.

I got one of the first Sony Walkmans when they came out an eon or so ago. It's great to listen to tapes people send me promoting health products which are guaranteed to change my life, or have music with me when I'm out brisk-walking or skiing. The local Dollar Store had a Chinese AM/FM cassette player, with earphones and two small desk speakers ... are you ready? ... for $10!

I couldn't resist another Dollar Store Chinese deal ... an AM/FM radio, plus dual cassettes, with high-speed dubbing. Ready? $20! When I got this treasure home I found it had an added benefit not mentioned on the box. In some way, when I tuned the AM band, it was overlaid with shortwave stations ... roaring in. Yow! That's probably why they dumped 'em for such a low price, once a boatload of 'em arrived at Curtis up in Etibicoke, Ontario.

I'm just as cheap ... er ... thrifty ... in my travels. I keep a daily diary on my laptop when I go on trips. I've put these into two five-buck books that'll have you reading out loud to your family. One covers my trips to Russia, Ukraine, St. Pierre, London, Munich, Krakow, Prague, and Vienna. The other, my scuba diving and ham visiting trips all around the Caribbean and the Hawaiian Islands. Eleven countries in 21 days, diving all but one (Guadeloupe), where the hams kept me too busy with parties. Too expensive? How about $360 to visit all eleven islands? Have you visited Barbados, Tobago, Grenada, St. Vincent, Guadeloupe, Antigua, Montserrat, Anguilla, Nevis, St. Kitts, or St. Lucia? What's

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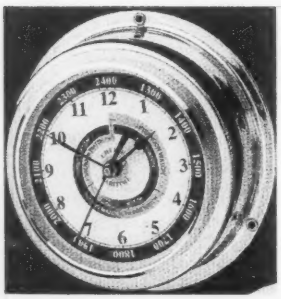

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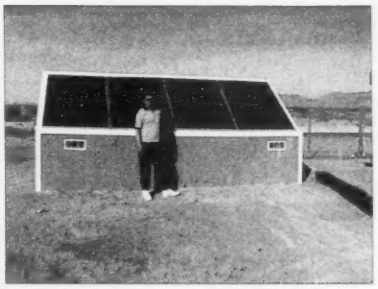
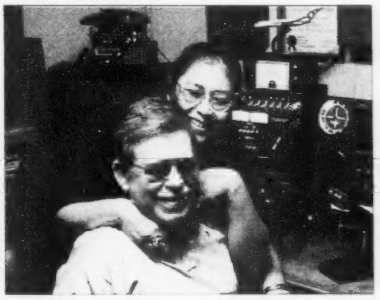
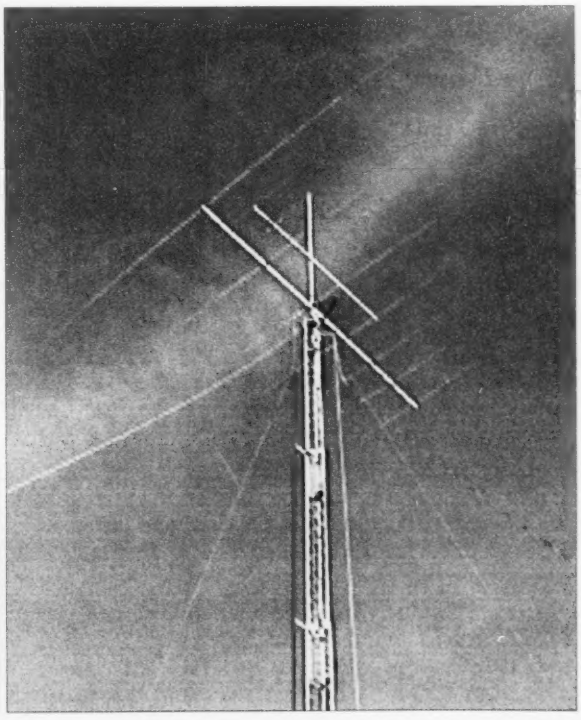




Art Bell W60BB Gets a visitor!



PROPAGATION

Jim Gray II
210 East Chateau Cir.
Payson AZ 85541
[akdhc2pilot@yahoo.com]

Skip City

Like July, August is set firmly in the HF "doldrums" of summer, so solid DX will be a challenge to find. Expect high signal attenuation during the day with D-layer absorption peaking at local noon. High noise levels will be the norm most nights, but a lingering E-layer may provide weak-but-steady propagation up to midnight. Don't forget that sporadic-E can appear any time, especially when solar flux has been high and the geomagnetic index low.

For those seeking unusual long-distance contacts, the best bet is on morning and evening gray-line propagation. The most efficient technique is to use a gray-line calculator (many can be found on-line) to determine when the transition occurs. By keeping skip distances in mind you can often pinpoint where your windows of opportunity will arise. By "parking" your receiver on frequency ahead of time you can be ready for those distant stations as they pop up, but remember, the window for any location will only last about twenty minutes. Good luck!

Band by Band Summary

10 and 12 meters

Signals will be weak due to daytime absorption, but some openings can still be found, especially from the southeast through southwest. Peaks will occur in the morning or late afternoon, with evenings remaining weak but open until 9 or 10 p.m. Skip should fall between 1,000 and 2,000 miles.

15 and 17 meters

DX should be slightly improved over last month with stronger signals heard early in the morning or late in the afternoon. These bands should hold up well into the evening, especially later in the month. Skip should extend out to 2,300 miles.

20 meters

Expect strong signals in the morning, late afternoon, and evening hours. Some days the band should hold up past midnight,

August 2001

SUN	MON	TUE	WED	THU	FRI	SAT
			1 F	2 F-P	3 P	4 F-P
5 F	6 F-P	7 F	8 F-P	9 F	10 F-P	11 P
12 F-P	13 F	14 F-G	15 F	16 F-P	17 F-P	18 F
19 F-G	20 F-G	21 F	22 F	23 F-G	24 G	25 G
26 F-P	27 P	28 F-P	29 F	30 F-G	31 F	

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
Central America	15-20	(15) 30	20 (40)	(20-40)	x	(20)	20	(20)	(15)	(15)	15 (20)	(10) 17
South America	15 (20)	(15) 20	20 (40)	(20-40)	(20)	x	(15)	(15)	x	(10)	(10-20)	(10) 20
Western Europe	20	20	(20-40)	(40)	x	(20)	x	x	x	x	(20)	20
South Africa	x	(40)	x	(20)	x	x	x	x	(15)	(15)	x	x
Eastern Europe	20	20 (40)	(20)	x	x	x	(20)	x	x	(15)	(15)	(20)
Middle East	20	20 (40)	(20)	x	x	x	x	x	x	x	(20)	(15)
India/ Pakistan	(15-20)	(20)	x	x	(20)	x	x	x	x	x	x	x
Far East/ Japan	(15)	x	x	x	x	x	(20)	(15-20)	(15)	x	x	(15)
Southeast Asia	(15-20)	x	x	(20)	x	x	(20)	x	x	(15)	x	x
Australia	(15)	(15)	x	x	(20-30)	(20-30)	(20)	(20)	x	x	x	x
Alaska	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	(15)	(15-20)
Hawaii	(15-20)	(15-20)	(15-20)	20	20 (40)	(20-40)	(20)	(20)	x	x	x	(15)
Western USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20-40)	(15) 20	(10) 20	(10-20)	(10-20)	(10-20)	(10) 20

CENTRAL UNITED STATES TO:

Central America	(10) 20	(15) 30	20 (40)	20 (40)	(20-40)	(20)	(20)	(15) 20	(15-20)	(10-20)	(10-20)	(10) 17
South America	10 (20)	(10) 20	(15) 30	(15) 30	(20-40)	(20)	(20)	(15)	(15)	(10)	(10-15)	(10-20)
Western Europe	(15) 20	20	(20-40)	(20-40)	x	(20)	(20)	x	x	x	x	(15-20)
South Africa	x	x	(40)	(20-40)	(20)	x	x	x	(10-15)	(10-20)	(20)	x
Eastern Europe	(20)	(20)	(20)	(20)	x	x	(20)	(20)	x	(15)	(15-20)	(15-20)
Middle East	(15-20)	(20)	(20)	(20)	x	x	x	x	x	x	(20)	(20)
India/ Pakistan	(15-20)	(15-20)	(20)	x	x	x	(20)	x	x	x	x	x
Far East/ Japan	x	(15)	(15)	x	x	(20-40)	(20)	20	(20)	x	x	x
Southeast Asia	(15)	(15)	(15-20)	(20)	x	x	(20)	(20)	(15-20)	(15)	(15)	x
Australia	(15)	(15)	(15)	(20)	20 (40)	(20-40)	(20-40)	20	(20)	x	(15)	x
Alaska	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-40)	(10) 30	(10-20)	(10-20)	(10) 20
Hawaii	(15-20)	15 (20)	(15-20)	20	20	(20)	20	(20)	x	x	x	(15)

WESTERN UNITED STATES TO:

Central America	(10) 17	(15) 20	(15) 20	20	(20)	(20)	(20)	(20)	(20)	(10-20)	(10-15)	(15-20)
South America	(10-20)	(10) 17	15-20	(15) 20	(20)	(20)	(20)	(15)	(15)	x	(15)	(10-15)
Western Europe	(15-20)	(20)	20	(20)	x	x	x	(20)	(15)	(15)	(20)	(15-20)
South Africa	x	x	x	(20)	(20)	x	x	(20)	(20)	(15)	x	x
Eastern Europe	(15-20)	(20)	(20)	(20)	x	x	x	(20)	x	x	x	(15-20)
Middle East	(20)	(15-20)	(15-20)	(20)	x	x	x	x	x	x	x	(20)
India/ Pakistan	x	x	(15)	x	x	x	x	(20)	x	(15)	x	x
Far East/ Japan	(15)	(15)	(20)	(20)	(20)	(20-40)	(20-40)	(20)	(20)	(15-20)	x	(15)
Southeast Asia	x	x	(15)	(15)	x	(20)	(20)	(20)	(15-20)	(15-20)	(15)	x
Australia	(10-15)	(10-15)	15	(15-20)	20	20	20	(20)	20	(20)	x	(15)
Alaska	(10) 40	(10) 40	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	20-40	(15) 40	(10) 40	(10) 40	(10) 40
Hawaii	(10-15)	(10-20)	(10-20)	(15-20)	20	20	(20-40)	20 (40)	(20-40)	x	x	(10-15)
Eastern USA	(10) 30	(10) 30	(10) 40	(15) 40	(20) 40	(20) 40	(20-40)	(15-20)	(10) 20	(10-20)	(10-20)	(10) 20

Table 1. *Band, time, country chart. Plain numerals indicate bands which should be workable on Fair to Good (F-G) and Good (G) days. Numbers in parentheses indicate bands usually workable on Good (G) days only. Dual numbers indicate that the intervening bands should also be usable. When one number appears in parentheses, that end of the range will probably be open on Good (G) days only.*

especially west or northwest of your location. Short-skip can vary between 500 and 200 miles during the day and from 1,000 to 2,300 miles at night.

30 and 40 meters

Atmospheric noise will continue to plague these bands, but some improvement should be seen late in the month. Try the gray-line technique for your best chance at very long distances. Skip can vary between 500 to 2,000 miles at night and about 750 miles during the day.

80 and 160 meters

High static will mask signals on these bands most of the time, but late August may provide some relief for this situation. Peaks will occur around midnight and in the hour or so before sunrise. Short skip will be between 1,000 and 2,000 miles. 73

QRX

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There is no drawing against "tomorrow." You must live on today's deposits. Invest it so as to get the biggest return, the utmost in health, happiness, and success! Always make the most of today.

To realize the value of ONE YEAR, ask a student who has failed his final exam.

To realize the value of ONE MONTH, ask a mother who has given birth to a premature baby.

To realize the value of ONE WEEK, ask an editor of a weekly newspaper.

To realize the value of ONE DAY, ask the daily wage laborer who has ten kids to feed.

To realize the value of ONE MINUTE, ask the student who has missed the school bus.

To realize the value of ONE SECOND, ask the person who has survived an accident.

To realize the value of ONE MILLISECOND, ask the person who won the silver medal at the Olympics.

Treasure every moment you have. Share it with someone special, because TIME never waits.

Thanks to The Purple Crystal, *a bulletin of the Independent Repeater Association, Inc., December 1997.*

Yasme Amateur Radio Foundation to Publish History

A husband-and-wife team who took ham radio to some 200 countries will be the main subjects of a book soon to be published. The Yasme Foundation has commissioned a full-length history of the foundation and a biography of its two principal luminaries, Lloyd Colvin W6KG (who died in 1993) and Iris Colvin W6QL (who died in 1998).

The assistance of radio amateurs and others around the world is sought in this effort. The foundation has retained freelance writer Jim Cain K1TN to write the book. Anyone with information to share (reminiscences, anecdotes, photos, etc.) may contact him at [yasmebook@mybizz.net].

"The foundation is extremely pleased to have Jim Cain, a writer well-known and respected among radio amateurs and a licensed ham since 1961, to research and write this important amateur radio history of Lloyd and Iris Colvin, W6KG and W6QL. "We believe that Jim is the most qualified person for the job," said Yasme Foundation president Wayne Mills.

The Yasme Foundation is a not-for-profit corporation organized to conduct scientific and educational projects related to amateur radio, including DXing and the introduction and promotion of amateur radio in underdeveloped countries.

Lloyd and Iris Colvin visited and operated from more than 200 ARRL DXCC countries, including nearly every member-country of the United Nations. Other amateur radio operations under the Yasme banner were conducted by Danny Weil VP2VB; Martti Laine OH2BH; and the late Dick McKercher WØMLY, among others. A list of Yasme operations can be found at [http://www.yasme.org].

The Yasme Foundation's officers and directors are Wayne Mills N7NG (president); Rusty Epps W6OAT; Bob Vallio W6RGG; Charles "Mac" McHenry W6BSY; G. Kip Edwards W6SZN; Martti Laine OH2BH, and Fred Laun K3ZO.

Thanks to Yasme.

Words of Wisdom?

"The wireless music box has no imaginable commercial value. Who would pay for a message sent to nobody in particular?" — David Sarnoff's associates, in response to his urgings for investment in the radio in the 1920s.

Thanks to the February 1997 issue of The Communicator, *monthly newsletter of the Central New Hampshire ARC.*

What Goes Around

Junior had just received his brand-new driver's license. The family trooped out to the driveway, and climbed into the car, where he was about to take them for a ride for the first time. Dad immediately headed for the backseat, directly behind the newly minted driver.

"I'll bet you're back there to get a change of scenery after all those months of sitting in the front passenger seat teaching me how to drive," said the beaming boy to the ol' man.

"Nope," came Dad's reply. "I'm gonna sit here and kick the back of your seat as you drive, just like you've been doing to me all these years."

Thanks to Stu Greenwood AB7BA, from Giggle Hertz in the Nov. 1998 issue of Radio Flyer. 73

Read All About It!

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in 1835. That same year he invented the relay, which contained all the technology needed for the telegraph, but Henry was not interested in pursuing this application. In fact, he readily shared his electrical knowledge with Morse, who was in dire need of it, when Morse was bringing his idea to reality in 1837. Henry also invented the first electric motor, a rocking-arm contraption which he referred to as a toy. The unit of inductance is named after Henry.

James Clerk Maxwell (English) produced the most stunning synthesis in electrical history in 1864 when he brought the results of Ampere, Faraday, Henry, and others together into a single set of equations describing literally all electromagnetic phenomena. An obscure and nonstandard unit of magnetic flux is named for him — a poor tribute to the greatest electrical theorist of the nineteenth century.

One of the predictions of Maxwell's equations was the existence of electromagnetic waves with a velocity equal to the velocity of light, which had already been measured. Heinrich Hertz, a German, actually produced the waves predicted by Maxwell (wavelength, about six meters) in 1888. The international designation for cycle-per-second, the hertz (Hz) is named for him. Marconi, in Italy, read of the early death of Hertz, and of his researches, in 1894, and went on to invent wireless telegraphy.

Émile Baudot (French) invented a 5-bit code to represent the letters of the alphabet and other characters in 1875. The unit of data transmission, the baud, is named for him. In a great miscarriage of justice, the inventor of the digital computer (Charles Babbage, 1833) goes unrecognized, with nothing named after him.

Has anyone else been left out in assigning unit names to electrical quantities? Yes, indeed! Benjamin Franklin's researches in electricity predate all others mentioned above. In 1752 he flew a kite into a thunder cloud to prove that lightning is a huge electrostatic discharge. He invented the

lightning rod, the first practical success in controlling electricity. He experimented with the lethal effects of electric shock. He invented the terms armature, battery, and condenser. He recognized that electric current was a flow of something, and postulated the positive-to-negative direction. Yet when honors were passed out by the naming of electrical units, Franklin was passed over. 73

On The Go

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as well as the information you need to join. Naturally there is a bit of paperwork involved, including an application and a copy of your amateur radio license. After everything is processed, you'll receive a copy of the correspondence course and your callsign. Navy MARS stations begin with "NNNØ" followed by three letters. For about six months you'll be in a training mode, working on the correspondence course and participating in net operations. During this time you'll have the designation "Tango" added to the end of your MARS callsign. This lets others know that you are going through the same training as everyone else. Other MARS operators are normally very helpful, especially to a newcomer, and this lets them know that you are learning how the service operates. Once you have met all of the training requirements, the final "T" will be dropped from your callsign and you will function as a full-fledged MARS member.

If you are looking for an opportunity to try a different aspect of the hobby and make a real contribution, you should check into opportunities with MARS. If you are a veteran and ever had the chance to send or get a message by MARS, you can pass the favor on to those in uniform today. On top of it all, you'll meet a great group of hams doing something pretty special. 73

QRP

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boxes and found about a dozen assembled Micro M controllers. They look complete, but they are not tested. I don't really recall why I have them. If you want one of the dozen or so, they're ten bucks each, and that includes shipping. I would suggest you send me an E-mail if you want one. Remember that these are not tested and may or may not work.

I also have some bare PC boards. These are $5 each. I have several dozen PC boards on hand. When these are gone, there will be no more!

Next time, I'll look at a really compact HF antenna. I'll also do a few home-brew single band antennas, too. 73

Homing In

continued from page 48

RDF adventures. PCC's other Saturday scholars watched in amazement as these high school kids roamed the campus, tracking down my camouflage-painted ammunition boxes with quarter-wavelength whips on top and two-meter transmitters inside.

Hats off to KF6DSA and AD6PQ for putting together a first-rate ham radio and RDF experience for NASA-PSA and Upward Bound students. The spring 2001 semester is over, but I'm sure that it won't be the end of RDF adventures for Pasadena's youth. The receivers, antennas and attenuators are ready for the next group. The hams are ready, too.

"I'm recommending to Dr. Conner that he consider budgeting a project to build some transmitters for foxhunting in 2002," Mark says. "We would also spend more class and field time getting into the technology of RDF. The returning kids from this year would gain more experience and would train the new ones in it.

"I'd like to get it to the point where PRC members are ham ambassadors for the local scout troops," KF6DSA continues. "Another ham in PRC wanted to start this, but he couldn't latch onto the funding to build 20 RDF sets. Now we have 'em!"

I learned a lot from my experiences with NASA-PSA at PCC. Perhaps my most important discovery was that there are agencies eager to provide funding to educational activities like this. Now you know it, too. Will your ham club be the next to use such sponsorship to obtain the materials for acquainting young people with Amateur Radio and RDF?

My "Homing In" Web site has links to Upward Bound and NASA-PSA sites, and tells about simple RDF equipment that students can build. Send E-mail or postal mail to me if you want to get in touch with organizers of the Pasadena sessions to get their suggestions. Get started now, and when you put on a similar program in your area, be sure to let me know about it.

The Best in Action

Final preparations are underway for the First USA ARDF Championships as this issue reaches your mailbox. Dozens of radio-orienteers will arrive in Albuquerque, New Mexico on July 31st for four days of training, competition and fellowship. Participants are expected to come from coast to coast and in between, plus Australia, China, Mongolia and Ukraine.

It's too late for registration to compete. However, it may still be possible to view the events, two meters on Thursday and 80 meters on Friday. In accordance with International Amateur Radio Union rules, each day's hunt will have five transmitters hidden throughout a very large section of forested terrain in the nearby mountains. Contact the Albuquerque Amateur Radio Club (E-mail to [abqardf@yahoogroups.com]) for more information. 73

Never say die

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stopping you? The friendly hams and the fantastic scuba diving reefs are waiting for you. What's it take to get you off the couch?

How was it possible for Sherry and me to fly first class round trip to Munich, rent an Audi and visit hams in Austria, Poland, and Czechoslovakia, stay at excellent hotels, and do the whole works for under $1,000? Talk about thrifty!

PC Uses

The first personal computer arrived in January 1975. In kit form from MITS, in Albuquerque. It was a last-minute desperate attempt by Ed Roberts to keep his company afloat. He'd bet heavily on making the first four-banger hand calculators. He was charging $129 for 'em and doing a pretty good business. He was even advertising 'em in *73* magazine.

Then, suddenly, came Casio with the same thing for $10, and pffft went MITS's bread and butter.

Ed had been a computer hobbyist, so he put the Altair 8800 out in kit form for computer hobbyists. One thing Ed didn't mention in his ads was that not all of the boards had ever been made to work. He figured that hobbyists would find this out quickly enough, and they would come up with fixes that he could then incorporate into later boards. Which is just what happened.

There was no software for the 8800. Nothing. You built it, flipped the switches on the front panel, and watched the lights dance.

Naturally, being a gadget nut, I bought one and put it together. Hmm, no input

Continued on page 64

Wise Up!

Here are some of my books which can change your life (if you'll let 'em). If the idea of being healthy, wealthy and wise interests you, start reading. Yes, you can be all that, but only when you know the secrets which I've spent a lifetime uncovering.

.....Wayne

The Secret Guide to Health: Yes, there really is a secret to regaining your health and adding 30 to 60 years of healthy living to your life. The answer is simple, but it means making some serious lifestyle changes. Will you be skiing the slopes of Aspen with me when you're 90 or doddering around a nursing home? Or pushing up daisies? No, I'm not selling any health products, but I can help you cure yourself of cancer, heart trouble, or any other illness. Get this new, 2001 expanded edition (156p). $10 (#05)

The Secret Guide to Wealth: Just as with health, you'll find that you have been brainwashed by "the system" into a pattern of life that will keep you from ever making much money and having the freedom to travel and do what you want. I explain how anyone can get a dream job with no college, no résumé, and even without any experience. I explain how you can get someone to happily pay you to learn what you need to know to start your own business. $5 (#03)

The Secret Guide to Wisdom: This is a review of around a hundred books that will boggle your mind and help you change your life. No, I don't sell these books. They're on a wide range of subjects and will help to make you a very interesting person. Wait'll you see some of the gems you've missed reading. You'll have plenty of fascinating stuff to talk about on the air. $5 (#02)

The Bioelectrifier Handbook: This explains how to build or buy ($155) a little electrical gadget that can help clean your blood of any virus, microbe, parasite, fungus or yeast. The process was discovered by scientists at the Albert Einstein College of Medicine, quickly patented, and hushed up. It's curing AIDS, hepatitis C, and a bunch of other serious illnesses. It's working miracles! The circuit can be built for under $20 from the instructions in the book. $10 (#01)

My WWII Submarine Adventures: Yes, I spent from 1943-1945 on a submarine, right in the middle of the war with Japan. We almost got sunk several times, and twice I was in the right place at the right time to save the boat. What's it really like to be depth charged? And what's the daily life aboard a submarine like? How about the Amelia Earhart inside story? If you're near Mobile, please visit the Drum. $5 (#10)

Wayne's Caribbean Adventures: My super budget travel stories – where I visit the hams and scuba dive most of the islands of the Caribbean. You'll love the special Liat fare which let me visit 11 countries in 21 days, diving all but one of the islands, Guadeloupe, where the hams kept me too busy with parties. $5 (#12)

Cold Fusion Overview: This is both a brief history of cold fusion, which I predict will be one of the largest industries in the world in the 21st century, plus a simple explanation of how and why it works. This new field is going to generate a whole new bunch of billionaires, just as the personal computer industry did. $5 (#20)

Cold Fusion Journal: They laughed when I predicted the PC industry growth in 1975. PCs are now the third largest industry in the world. The cold fusion ground floor is still wide open, but then that might mean giving up watching ball games. Sample: $10 (#22).

Julian Schwinger: A Nobel laureate's talk about cold fusion—confirming its validity. $2 (#24)

Improving State Government: Here are 24 ways that state governments can cut expenses enormously, while providing far better service. I explain how any government bureau or department can be gotten to cut it's expenses by at least 50% in three years and do it cooperatively and enthusiastically. I explain how, by applying a new technology, the state can make it possible to provide all needed services without having to levy *any* taxes at all! Read the book, run for your legislature, and let's get busy making this country work like its founders wanted it to. Don't leave this for "someone else" to do. $5 (#30)

Mankind's Extinction Predictions: If any one of the experts who have written books predicting a soon-to-come catastrophe which will virtually wipe most of us out are right, we're in trouble. In this book I explain about the various disaster scenarios, like Nostradamus, who says the poles will soon shift (as they have several times in the past), wiping out 97% of mankind. Okay, so he's made a long string of past lucky guesses. The worst part of these predictions is the accuracy record of some of the experts. Will it be a pole shift, a new ice age, a massive solar flare, a comet or asteroid, a bioterrorist attack? I'm getting ready, how about you? $5 (#31)

Moondoggle: After reading René's book, *NASA Mooned America*, I read everything I could find on our Moon landings. I watched the NASA videos, looked carefully at the photos, read the astronaut's biographies, and talked with some readers who worked for NASA. This book cites 45 good reasons I believe the whole Apollo program had to have been faked. $5 (#32)

Classical Music Guide: A list of 100 CDs which will provide you with an outstanding collection of the finest classical music ever written. This is what you need to help you reduce stress. Classical music also raises youngster's IQs, helps plants grow faster, and will make you healthier. Just wait'll you hear some of Gotschalk's fabulous music! $5 (#33)

The Radar Coverup: Is police radar dangerous? Ross Adey K6UI, a world authority, confirms the dangers of radio and magnetic fields, including our HTs and cell phones. $3 (#34)

Three Gatto Talks: A prize-winning teacher explains what's wrong with American schools and why our kids are not being educated. Why are Swedish youngsters, who start school at 7 years of age, leaving our kids in the dust? Our kids are intentionally being dumbed down by our school system — the least effective and most expensive in the world. $5 (#35)

Aspartame: a.k.a. NutraSweet, the stuff in diet drinks, etc., can cause all kinds of serious health problems. Multiple sclerosis, for one. Read all about it, two pamphlets for a buck. (#38)

$1 Million Sales Video: The secret of how you can generate an extra million dollars in sales just by using PR. This will be one of the best investments you or your business will ever make. $40 (#52)

Reprints of My Editorials from *73*. Very few things in this world are as we've been taught, and as they appear. I blow the whistle on the scams around us, such as the health care, our school system, our money, the drug war, a college education, sugar, the food giants, our unhealthy food, fluorides, EMFs, NutraSweet, etc.

1996 Editorials: 120 pages, 100 choice editorials. $10 (#72)

1997 Editorials: 148 fun-packed pages. 216 editorials. $10 (#74)

1998 Editorials: 168 pages that'll give you lots of controversial things to talk about on the air. $10 (#75)

1999 Editorials: 132 pages of ideas, book reviews, health, education, and anything else I think you ought to know about. $10 (#76)

2000 Editorials: 76 pages (thinner magazine as a result of our slowly dying hobby). $5 (#77)

Silver Wire: With two 5-in. pieces of heavy pure silver wire + three 9V batteries you can make a thousand dollars worth of silver colloid. What do you do with it? It does what the antibiotics do, but germs can't adapt to it. Use it to get rid of germs on food, for skin fungus, warts, and even to drink. Read some books on the uses of silver colloid, it's like magic. $15 (#80)

Colloid Reprint. April 97 article on a silver colloid maker, history, and how to use the stuff. $5 (#98).

Colloid Kit. Three 9V battery clips, 2 aligator clips & instructions. $5 (#99).

Wayne's Bell Saver Kit. The cable and instructions enabling you to inexpensively tape Art Bell W6OBB's nightly 5-hr radio talk show. $5 (#83)

NH Reform Party Keynote Speech. It wow'd 'em when I laid out plans for NH in 2020, with much better, yet lower cost schools, zero state taxes, far better health care, a more responsive state government, etc. $1 (#85)

Stuff I didn't write, but you need:

NASA Mooned America: René makes an air-tight case that NASA faked the Moon landings. This book will convince even you. $30 (#90)

Last Skeptic of Science: This is René's book where he debunks a bunch of accepted scientific beliefs – such as the ice ages, the Earth being a magnet, the Moon causing the tides, and etc. $30 (#91)

Dark Moon: 568 pages of carefully researched proof that the Apollo Moon landings were a hoax—a capping blow for René's skeptics. $35 (#92)

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Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to: *73 Magazine*, Barter 'n' Buy, 70 Hancock Rd., Peterborough NH 03458 and get set for the phone calls. The deadline for the October 2001 classified ad section is August 10, 2001.

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NEVER SAY DIE

continued from page 64

device. So I turned to Southwest Tech, which had just released a keyboard, and built one of those. When it didn't talk to the Altair I fussed with both companies, but neither had an answer. Then I got a call from a 16-year old hobbyist and he had the answer for me.

In January 1976 MITS held an Altair user conference. By this time some questions had been raised about what we hobbyists might be able to do with these light-flickering contraptions. The only suggestion Ed made was that well, they might be used to control a grass watering system. It's 25 years later and still I haven't seen that system in my gardening catalogs.

Olson, DEC's president, when asked about home computers, ridiculed the question. Why on earth would anyone ever want a computer at home? His brilliant foresight helped kill the biggest minicomputer company in the world. The same mindset also killed Wang, Data General, Prime, and all the other minicomputer companies. 73

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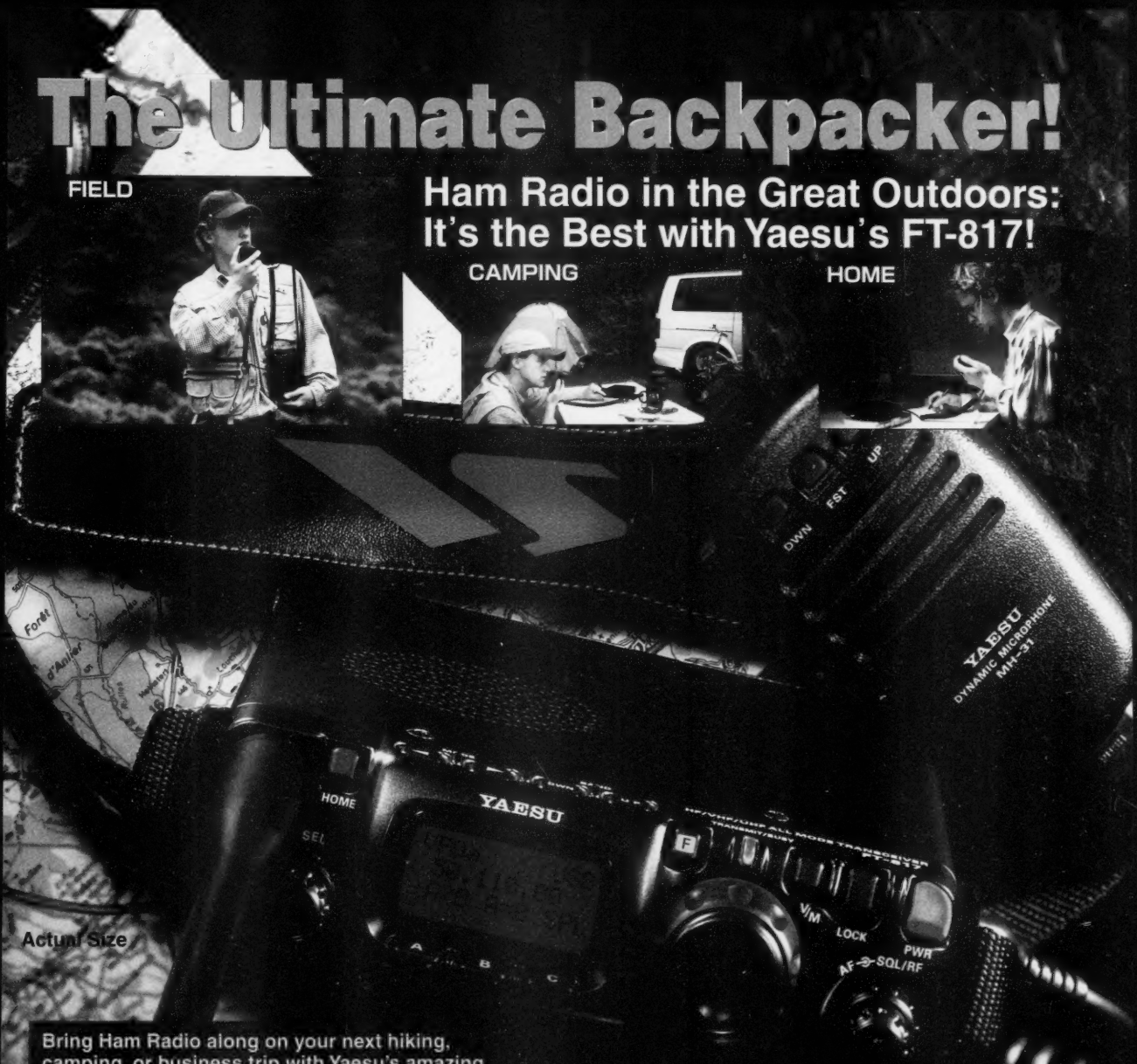

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●MULTIMODE DESIGN: Ready for action on SSB, CW, AM, FM, FM-Wide (Rx), 1200/9600 bps Packet, and Digital, including dedicated USB and LSB PSK-31 configurations.

●5 WATTS POWER OUTPUT: Using a new-technology all-band MOS FET power amplifier, the FT-817 provides 5 Watts of power output when using a 13.8 Volt DC source. When using Alkaline batteries or the optional FNB-72 Ni-Cd Battery Pack, power is automatically set to 2.5 Watts via Menu. this can be changed to 0.5 Watt, 1 Watt, or up to 5 Watts.

●WIDE CHOICE OF POWER SOURCES: The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.

●TWO ANTENNA PORTS: A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.

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[1] Note that certain frequencies are unavailable. [2] 5W output

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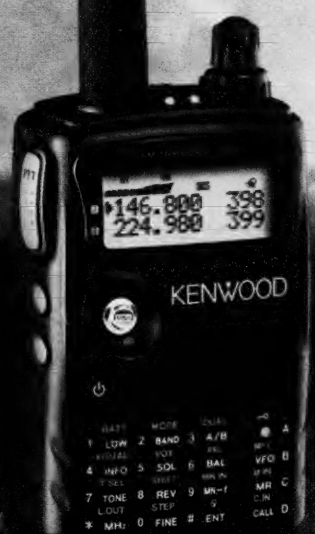

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